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PACIFIC MARINE REVIEW

JANUARY, 1939

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Official Organ

Pacific American Steamship Association

Shipowners Association of the Pacific Coast

TABLE OF CONTENTS

Editorial Comment:

Pacific Coast Shipbuilding 17

Status and Trends of World Shipbuilding 18

Your Problems Answered 22
By "The Chief"

Steady As You Go! 25
Air-Borne Damage to Sea-Borne Cargoes,
By Oliver D. Colvin, Werner H. E. Hahne and Mark R. Colby

Marine Electrical Progress 28
By H. C. Coleman

Diesel Tug Dauntless No. 12 30

Running Lights of Pacific Coast Shipping As Reviewed From Our 1938 Editions 33

Electrical Developments in 1938 49
By Guy Bartlett

Tankers Imperial and Petrolite 50

On the Ways 52
Latest News from American Yards

Midget Radio Telephone 55

Vortex Syncro Silencer 56

A Notable Bore Grinding Set-Up 62

Building in American Yards 64

Miscellaneous: Engineers' Licenses, 24; Deck Officers' Licenses, 27; Changes of Masters, 27; Literature of the Industry, 27; Taxes to be Surveyed, 68.

PUBLISHED AT 500 SANSOME STREET . . . . SAN FRANCISCO

Entered as second class matter June 20, 1913, at the post office, San Francisco, under the Act of March 3, 1879. Published on the 1st of each month. Advertising and editorial forms close on the 15th. Subscription price, one year: Domestic, $1.50; foreign, $2.50; two years: Domestic, $2.50; foreign, $4.00; three years: Domestic, $3.00; foreign, $5.50; single copies, 25c. Chas. F. A. Mann, Northwest Representative, 1110 Puget Sound Bank Bldg., Tacoma, Washington. New York Office, Suite 404-405-406, Two Hundred Broadway, Telephone COrdlandt 7-3579.

In New York City copies of Pacific Marine Review can be purchased at the news stands of I. Goldberg, 42 Broadway; Harry Nash, 17 Battery Place; Philip Mandara, Greenwich Street and Battery Place. In Washington, D. C., at the news stand of the Carlton Hotel, 16th and K Streets.

J. S. Hines
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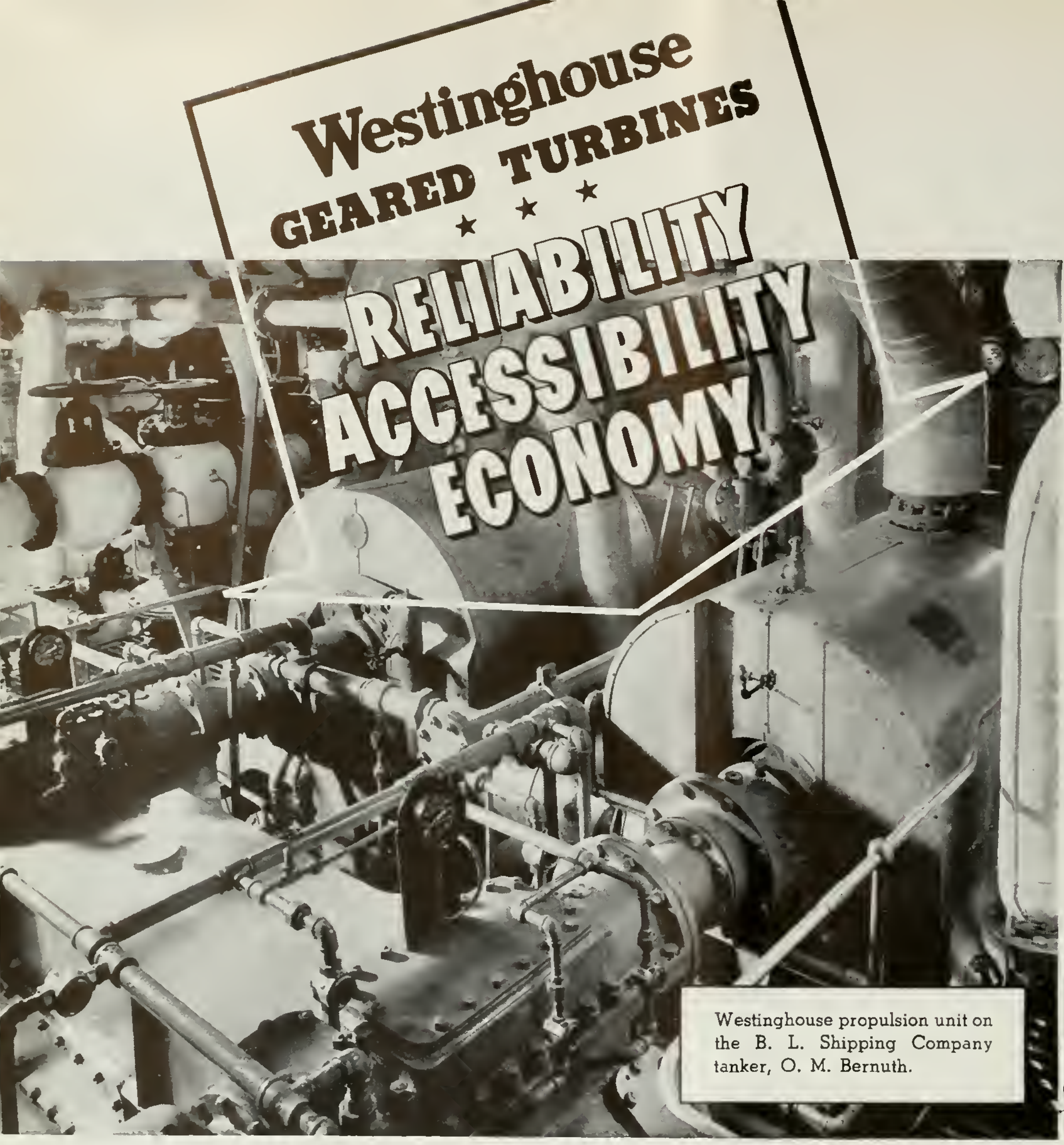

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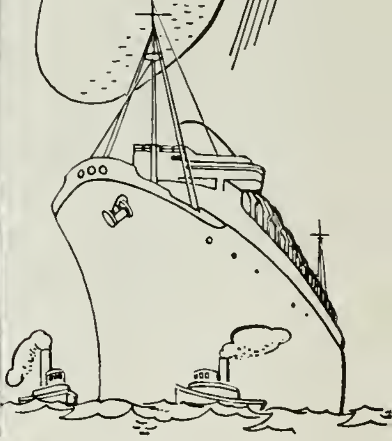

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PACIFIC MARINE REVIEW

VOLUME XXXVI JANUARY, 1939 NUMBER 1

Pacific Marine Prospects

As the Pacific-American Merchant Marine enters 1939 it faces a year full of the hope and promise of renewed life and vigor.

Possibly the great achievement of 1938 was the awakening of public consciousness on the Pacific Coast to the value of and the necessity for American-flag shipping services in Pacific Coast ports.

The lessons brought by losses to business through maritime labor troubles during the past five years were emphasized very strongly in 1938 by the discontinuance of many services. This aroused the public bodies of our port cities to bring great pressure for restoration of these services and to bring to Pacific Coast shipyards their share of the great Government program for the construction of merchant vessels.

As a result of these efforts Pacific-American Merchant Marine enters 1939 with its services 60 per cent restored and with a U. S. Maritime Commission contract for the construction of two vessels in a San Francisco Bay shipyard.

These initial tangible results for their efforts will serve only to whet the appetites of our aroused public bodies, and we confidently expect to see in 1939 great progress made toward the reestablishment of American-flag shipping on the Pacific and the building of replacement tonnage therefor in Pacific Coast shipyards.

The plans for replacement of tonnage include: three express passenger liners of the Coolidge type for the American President Lines at a total cost of approximately $36,000,000; seven modified C-3 type passenger and cargo carriers for the American President Lines at a total cost of approximately $30,000,000; four ships of special design for the Pacific Argentine Brazil Line at total cost of approximately $14,000,000; four ships for operation from Pacific Northwest to Orient at a total cost of approximately $10,000,000; and four similar ships for Pacific Coast - European service at a total cost of approximately $10,000,000.

This program immediately pending calls for $100,000,000 worth of shipbuilding. All of these ships except the three Coolidge type can be built in existing Pacific Coast yards with comparatively little make-ready expense. The largest ships in the program, leaving out the Coolidge type, are the same size and type as the two which the Moore Dry Dock Company of Oakland, California, is now preparing to build.

Therefore we may assert that with proper cooperation and pressure we have within our grasp a shipbuilding program that will involve the expenditure of $64,000,000 in Pacific Coast shipyards during 1939 and 1940.

This large program is all for foreign trade overseas shipping and is only a part of the whole plan for that branch of Pacific Coast shipping.

In addition there are large possibilities and opportunities in connection with coastwise and intercoastal shipping and in connection with vessels for various departments of the Federal and State Governments.

Practically every vessel now operating in intercoastal trade is of obsolescent age and will soon be needing replacement. One of the measures which will be up for discussion in the new Congress will be the proposal to lend Federal Government assistance to the rebuilding of this fleet. Such a measure would be very justifiable from the standpoint of national defense, since intercoastal vessels, even more than offshore shipping, would be readily available for Army and Navy auxiliaries in times of national emergency.

With our present unified Pacific Coastwide effort and the large stake that Pacific Coast business has in the Pacific-American Merchant Marine, there is strong reason for Pacific Coast shipyards to look forward with good expectancy for many new contracts in the years immediately ahead.

Two ships are only a beginning. Let's build the new Pacific-American Marine in Pacific Coast shipyards.

1938 Status and
PRESENT TRENDS in SHIPBUILDING

The periodical statements of the world's ship classification societies reveal very interesting facts and trends in the shipbuilding and shipowning status of the principal maritime nations.

Lloyd's Register of Shipping has recently issued its report of operations for the fiscal year 1937-1938. From this document we have reproduced three tables, which show interesting trends.

Table 1 gives the number and aggregate gross tonnage of vessels, each of 100 gross tons or upward, owned by the principal maritime nations in 1914 and in 1938. During this twenty-four-year period there have been tremendous changes in the distribution, the number, and the average size of vessels, as shown in this table.

- **Average Size**

The entire merchant fleet of the world has increased 47.3 per cent in tonnage and 20 per cent in number. In 1914 the average gross measurement of a merchant steamer was 1860 tons; in 1938 this figure had increased to 2260 tons. This point is important because other factors being equal, the size of the ship has a great influence on economy of cargo transport.

For British Empire vessels the average measurement in 1914 was 2027 gross tons, while that in 1938 was 2270 gross tons.

Japan, with an average size of about 1600 tons in 1914, increases to over 2400 tons in 1938, or better than 50 per cent. Germany, with 11 per cent increase in the number of vessels, has a 17.6 per cent decrease in the aggregate tonnage.

On her seagoing fleet the United States leads the world in per cent increase in tonnage. On average size she also has the largest increase, having passed from under 2000 tons in 1914 to over 3800 tons in 1938. This makes the average U. S. seagoing vessel 68 per cent larger than

COUNTRIES.	1914		1938		DIFFERENCE BETWEEN 1938 and 1914		
	No.	Gross Tons.	No.	Gross Tons.	No.	Gross Tons.	Tonnage per cent.
Great Britain & Ireland	8,587	18,892.089	6,843	17,675 404	—1,744	— 1,216,685	— 6·4
British Dominions, Colonies, etc. ...	1,536	1,631.617	2,218	3,013.686	+ 682	+ 1,412.069	+ 86·5
British Empire Total...	10,123	20,523.706	9,061	20,719.090	—1.062	+ 195,384	+ 1·0
Denmark	576	770.430	694	1,129,556	+ 118	+ 359,126	+ 46·6
France	1,025	1,922.286	1,246	2,880,783	+ 221	+ 958,497	+ 49·9
Germany	2,090	5,134,720	2,321	4,231,657	+ 231	— 903,063	— 17·6
Greece	407	820,861	638	1,889,269	+ 231	+ 1,068,408	+130·2
Holland	709	1.471.710	1,473	2,852,012	+ 764	+ 1,380,302	+ 93·8
Italy	637	1,430,475	1,156	3.258,992	+ 519	+ 1,828,517	+127·8
Japan	1,103	1,708,386	2.187	5,006,712	+1.084	+ 3 298.326	+193·1
Norway...	1,656	1,957,353	1,963	4,613,175	+ 307	+ 2.655,822	+135·7
Spain	589	883,926	793	947.963	+ 204	+ 64.037	+ 7·2
Sweden...	1.088	1,015,364	1,239	1.571.054	+ 151	+ 555.690	+ 54·7
United States (Sea)	1,113	2,026.908	2,338	8.936.465	+1 225	+ 6,909,557	+340·9
United States (Lakes)	579	2,260,441	519	2.467,430	— 60	+ 206,989	+ 9·2
Other Countries ...	2,749	3.477,311	3,781	6.365.993	+1,032	+ 2,888,682	+ 83·1
WORLD TOTAL...	24,444	45,403,877	29,409	66,870,151	+4,965	+21,466.274	+ 47·3

Table I.

REGISTER BOOK.	TOTAL STEAMER AND MOTOR TONNAGE (including Auxiliaries).	TYPE OF ENGINES.			FUEL.			
		STEAM RECIPROCATING.	STEAM TURBINES (including Turbo-Elec)	INTERNAL COMBUSTION ENGINES (including Diesel-Elec.)	COAL.		OIL.	
	Tons Gross.	Tons Gross.	Tons Gross.	Tons Gross.	Tons Gross.	Per cent.	Tons Gross.	Per cent.
1922–23	61,342,952	51,653,324	8,149,165	1,540,463	45,338,327	73·9	16,004,625	26·1
1923–24	62,335,373	51,775,239	8,893,749	1,666.385	44,876,570	71·9	17,458,803	28·1
1924–25	61,514,140	50,742,758	8,795,584	1,975,798	42,384,270	68·9	19,129,870	31·1
1925–26	62,380,376	50,566.029	9,100.274	2,714,073	41,862,181	67·1	20,518,195	32·9
1926–27	62,671,937	50,040,978	9,137,675	3,493,284	40,935,114	65·3	21,736,823	34·7
1927–28	63.267,302	49,767,495	9,228,983	4,270,824	40,514,719	64·0	22,752,583	36·0
1928–29	65,159,413	50,045,048	9,682,063	5,432,302	40,674,097	62·4	24,485,316	37·6
1929–30	66,407,393	50,573,689	9,205,602	6,628,102	40,358,396	60·8	26,048,997	39·2
1930–31	68,023,804	50,780,877	9,146,590	8,096,337	40,069,679	58·9	27,954,125	41·1
1931–32	68,722,801	50,225,758	9,065,610	9,431,433	39,289,061	57·2	29,433,740	42·8
1932–33	68,368,141	49,098,475	9,231,289	10,038,377	38,194,758	55·9	30,173,383	44·1
1933–34	66,627,524	47.206,393	9,220.739	10,200.392	36,373,859	54·6	30,253,665	45·4
1934–35	64,357,792	44,728,790	9,024,476	10.604,526	33.895,555	52·7	30,462,237	47·3
1935–36	63,727,317	43,360.749	9,061,877	11,304,691	32.537,556	51·0	31,189,761	49·0
1936–37	64,004,885	42,605,474	9,108,812	12.290,599	31,947,618	49·9	32,057,267	50·1
1937–38	65,271,440	42,221,346	9,301,381	13,748,713	31.746,906	48·6	33.524,534	51·4
1938–39	66,870,151	42,197,314	9,439,884	15,232,953	31,578,746	47·2	35,291,405	52·8

Table II.

the present world average for seagoing ships, and of a larger size than the ships of any other seagoing merchant fleet in the world.

● Distribution of Tonnage

The shift of the merchant tonnage of the world during the 24-year period covered by Table I is very remarkable. At the beginning of this period British Empire had 45 per cent; at the end of the period, 31 per cent, of the world's tonnage.

United States began this period with 4.5 per cent of the world's tonnage, ended it with 13.4 per cent.

Japan began with 3.8 per cent, ended with 7.5 per cent.

Germany in 1914 was the second nation on earth in maritime fleet strength, having 11.3 per cent of the world's tonnage. In 1938, even after a very remarkable recovery from the World War losses, she is in fifth place with 6.3 per cent. Germany and Great Britain and Ireland (considered as a unit apart from the dominions and colonies) are the only two countries to show a decrease in tonnage during the period under review.

● Propulsion Machinery Trends

Table II shows the types of engines and the fuel used in all the ships of the world by years from 1922-1938, as recorded in Lloyd's Register Book.

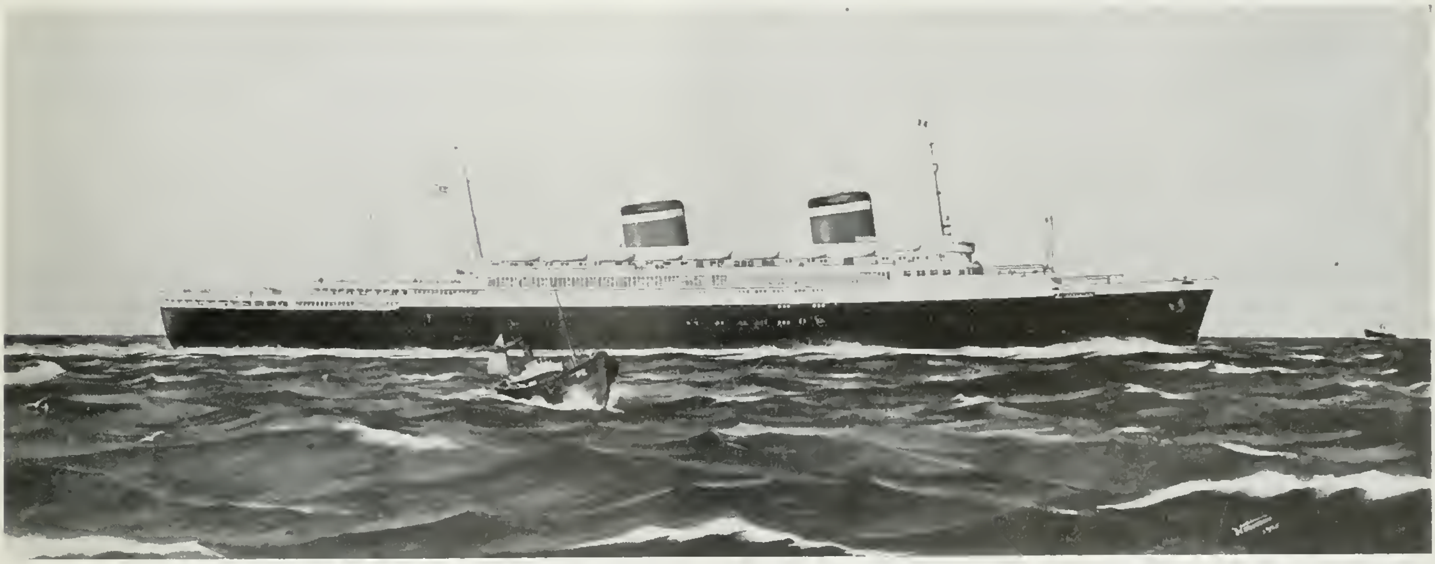
REGISTER BOOK.	TURBO-ELECTRIC.		DIESEL-ELECTRIC.		TOTAL.	
	No. of Vessels.	Gross Tons.	No. of Vessels.	Gross Tons.	No. of Vessels.	Gross Tons.
1925–26	21	84,562	15	25,742	36	110,304
1926–27	24	94,853	16	25,659	40	120,512
1927–28	22	85,384	26	51,516	48	136,900
1928–29	23	130,992	30	56,379	53	187,371
1929–30	24	171,150	36	88,317	60	259,467
1930–31	30	218,688	37	89,593	67	308,281
1931–32	38	342,400	46	114,690	84	457,090
1932–33	42	388,962	48	116,684	90	505,646
1933–34	43	448,434	48	117,184	91	565,618
1934–35	42	444,548	53	118,853	95	563,401
1935–36	42	480,236	57	121,261	99	601,497
1936–37	42	482,563	57	122,010	99	604,573
1937–38	42	483,150	62	129,237	104	612,387
1938–39	41	468,583	69	176,407	110	644,990

Table III.

The principal trend indicated in this table is the remarkable progress of the diesel engine, which began the period with 1,540,463 gross tons and ended with 15,232,953 gross tons. The steam turbine started with 8,149,165 tons, got up to 9,682,063 tons in 1929, and remained practically stationary thereafter, closing the period with 9,439,884.

The present status is that 63 per cent of the world's seagoing merchant tonnage is driven by reciprocating steam, 22 per cent by diesel engine, and 15 per cent by steam turbine. As of July 1, 1938, there were 281 steamers, of 998,052 gross tons, and 447 motorships, of 1,805,295 gross tons, under construction in the world's shipyards.

As to fuel, 47 per cent of the



Above is an artist's conception of S.S. America, the express passenger liner now building at Newport News for the U. S. Lines' transatlantic service as a running mate for the Washington and Manhattan. She will be somewhat larger than those two vessels, and will be the largest commercial ship built in an American shipyard.

PAN AMERICAN UNION
Statistical Division

Foreign Trade - 1937

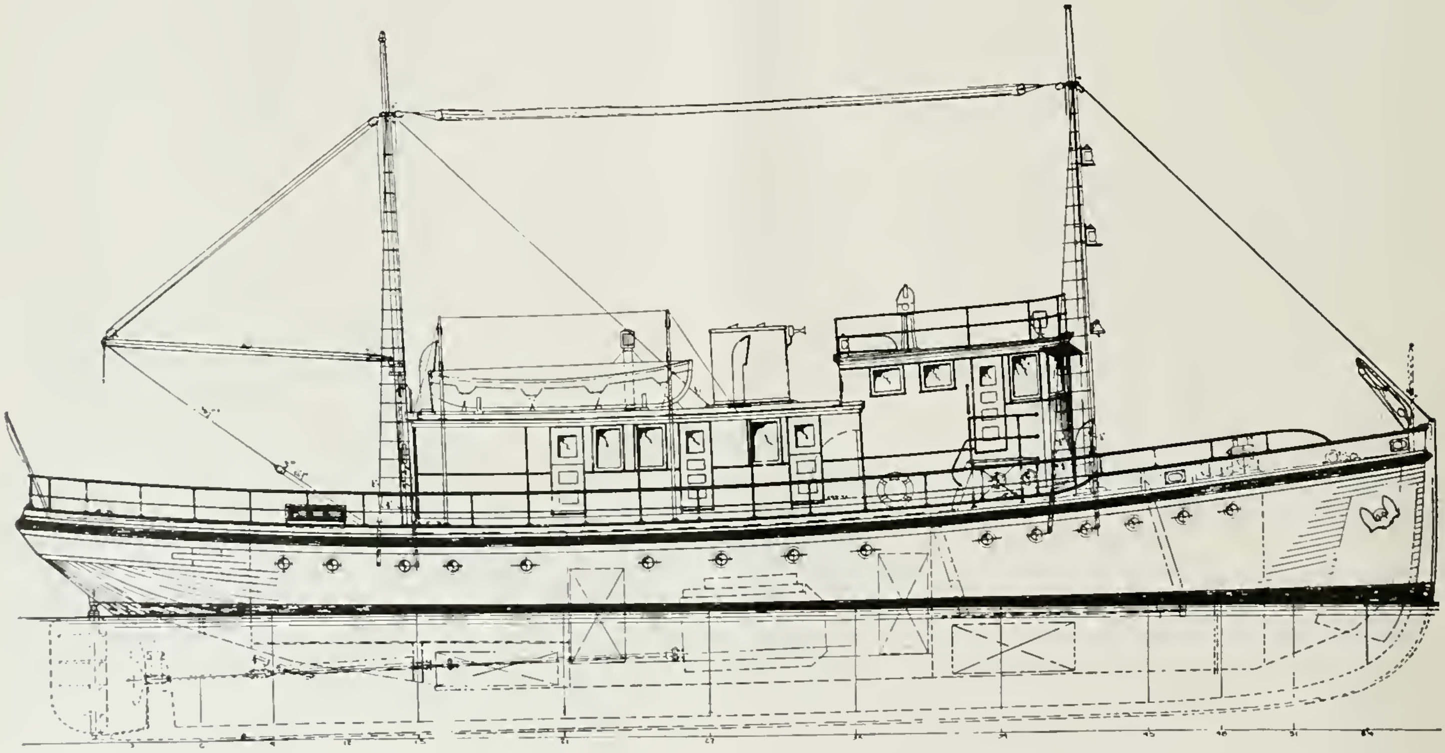
THE AMERICAS AT A GLANCE

(Approximate values in thousands of United States current dollars)

Country	Population	Area Square Miles	Capital	Population	Principal Exports (1)	Imports	Exports
Argentina	12,761,611	1,079,965	Buenos Aires	2,317,755	Maize, wheat and flour, meats, linseed, wool, hides, quebracho extract, oats, barley, dairy products, cotton.	482,259	715,485
Bolivia	2,911,283	419,470 (2)	La Paz	151,000	Tin, lead, silver, antimony, zinc, rubber, hides, wolfram, copper.	19,435	45,264
Brazil	44,002,095	3,286,170	Rio de Janeiro	1,585,234	Coffee, cotton, hides and skins, cacao, oil seeds and kernels, fruits, meats, carnauba wax, tobacco, rubber, mate.	463,429	444,028
Chile	4,585,705	286,396	Santiago	843,870	Copper, nitrate and iodine, wool, hides and skins, gold, iron ore, meat.	88,389	195,298
Colombia	8,665,000	476,916	Bogota	271,123	Coffee, petroleum, gold, bananas, hides and skins, platinum.	96,262	104,489
Costa Rica	606,581	23,000	San José	63,436	Coffee, bananas, cacao, gold, lumber, hides and skins.	11,879	11,512
Cuba	4,108,650	44,164	Habana	552,133	Sugar, tobacco and cigars, molasses, copper ore, rum, sponges.	129,572	186,071
Dominican Republic	1,581,248	19,325	Ciudad Trujillo	71,297	Sugar, cacao, coffee, molasses, corn, gold, tobacco.	11,692	18,120
Ecuador	2,554,744	(3)	Quito	107,192	Cacao, gold and silver ores, petroleum, coffee, gold bars, rice, straw hats, ivory nuts, bananas, rubber	11,334	14,124
El Salvador	1,631,967	13,183	San Salvador	98,555	Coffee, balsam, rice, henequen, indigo, sugar.	9,982	15,514
Guatemala	2,266,682	48,290	Guatemala City	116,000	Coffee, bananas, gold, chicle, honey, lumber, hides.	20,929	16,109
Haiti	3,000,000	10,700	Port-au-Prince	125,000	Coffee, cotton, sugar, sisal, bananas, cacao, logwood.	9,215	8,971
Honduras	962,685	46,332	Tegucigalpa	40,000	Bananas, gold and silver, coffee, leaf tobacco, coconuts, cattle, mahogany.	10,387	9,641
Mexico	16,552,722	760,372	Mexico, D.F.	1,229,576	Petroleum and products, silver, lead, gold, zinc, copper, henequen, coffee, bananas, vegetables.	170,317	247,638
Nicaragua	638,119	49,200	Managua	60,342	Coffee, bananas, gold, cotton, lumber, hides and skins, sugar, cacao.	5,621	7,038
Panama	547,536	34,170	Panama	82,872	Bananas, cacao, coconuts, cattle hides, mother-of-pearl shell.	21,896	8,619
Paraguay	1,000,000	154,165 (2)	Asunción	90,000	Cotton, quebracho extract, cattle hides, beef extract tobacco, mats.	8,500	8,270
Peru	6,147,000	(3)	Lima	291,531	Petroleum and products, cotton, copper bars, sugar, wool, hides and skins, bismuth, balata.	59,389	92,274
Uruguay	2,082,367	72,153	Montevideo	684,036	Wool, beef, canned meats, linseed, wheat, sand and stone, hides and skins.	44,980	55,266
Venezuela	3,451,677	393,976	Caracas	135,253	Petroleum and products, coffee, cacao, gold, hides and skins, pearls.	89,075	254,816
United States	132,597,800 (4)	3,738,395	Washington, D.C.	627,000	Machinery, cotton and manufactures, petroleum and products, automobiles and parts, iron and steel-mill products, chemicals and products, unmanufactured tobacco.	3,084,061	3,345,156

(1) Listed in order of importance according to value for the latest available year.
(2) Tentative.
(3) Exact area undetermined.
(4) Exclusive of the Philippine Islands and Military and Naval Services abroad.

A comprehensive tabulation of the resources of Latin America and of the trade between the United States and Latin America.



Outboard profile of the vessel for the Alaska service of the U. S. Coast and Geodetic Survey now building at the Astoria Marine Construction Company yard.

MERCANTILE FLEET OF THE UNITED STATES
IRON AND STEEL SELF-PROPELLED VESSELS OF 2,000 GROSS TONS AND OVER
AS OF APRIL 1st, 1938

(Excluding Great Lakes and Philippine Islands)

Arranged according to tonnage groups, types of motive power, total number of existing vessels built in a given year and number and percentage of total classed by the American Bureau of Shipping

nage Group	No. of Vessels	Gross Tonnage	Type of Machinery				
			Reciprocating	Turbine	Turbo-Electric	Diesel	Diesel Elec.
00 to 3000	180	445,763	164	4	1	5	6
00 to 4000	131	443,062	86	43	0	2	0
00 to 5000	162	765,836	109	45	1	3	4
00 to 6000	358	1,962,849	178	165	1	14	0
00 to 8000	396	2,692,272	256	114	7	16	3
00 to 10000	119	1,050,913	62	33	1	23	0
00 to 15000	42	507,869	17	18	2	5	0
00 to 20000	11	194,451	4	4	3	0	0
00 to 25000	5	115,631	2	2	1	0	0
00 and over	0	0	.0	0	0	0	0
TALS	1404 vessels	8,178,646 tons	878	428	17	68	13

NUMBER OF EXISTING VESSELS ACCORDING TO YEAR OF BUILD

17	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	Total
38	143	341	325	158	14	12	8	7	5	18	13	9	15	15	15	4	2	2	8	15	6	1404

Table IV.

world's tonnage still burns coal and 52.8 per cent burns oil fuel. It comes as something of a shock to any American marine engineer who has not kept tab on these conditions when he learns that only two years back there was more tonnage driven by coal fuel than by oil. An analysis of these figures will open up great opportunities for economies in marine propulsion.

- **Electric Propulsion**

Table III shows the progress made in the application of electric propulsion with both turbine and diesel prime movers. Approximately 1 per cent of present world seagoing tonnage is using the electric connection between prime mover and propeller.

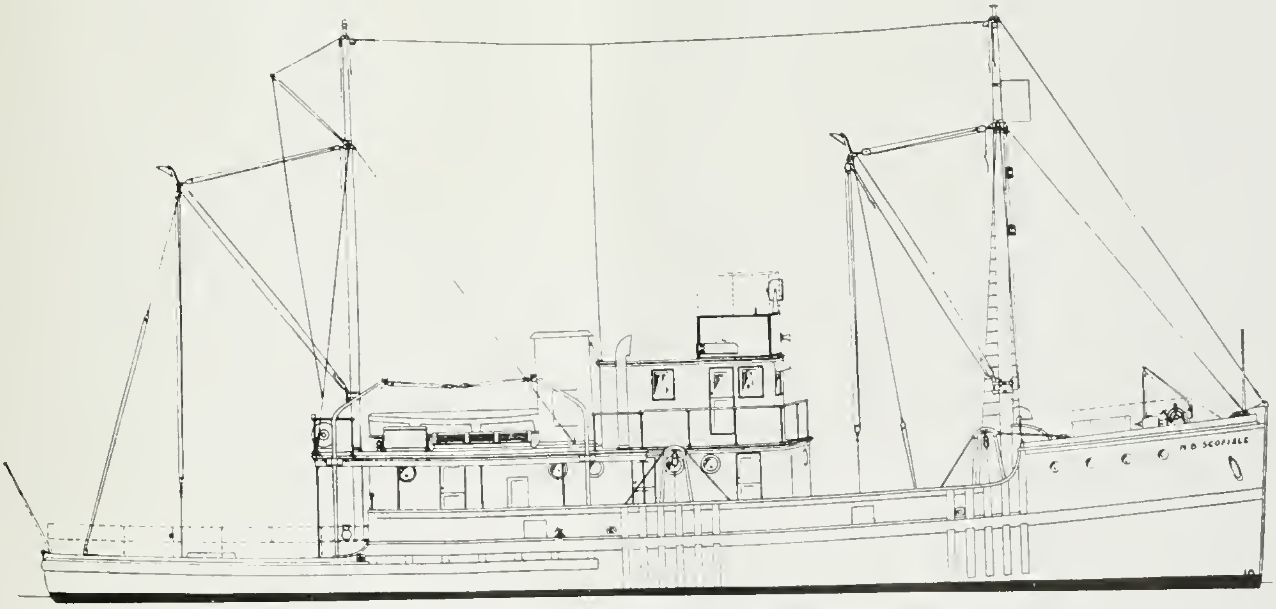
- **American Ocean-Going Fleet**

Possibly because our vessels are of comparatively large average size we in the United States have become accustomed to figuring our ocean-going ships as only those of 2000 gross tons and over. Table IV, compiled by the American Bureau of Shipping, gives the details of this American ocean-going fleet as of April 1, 1938. Noticeable is the average measurement, which is 5800 gross tons, as compared with the world average of 2260 gross tons. This large average size of American ships may be one reason why we are not so interested in superliners.

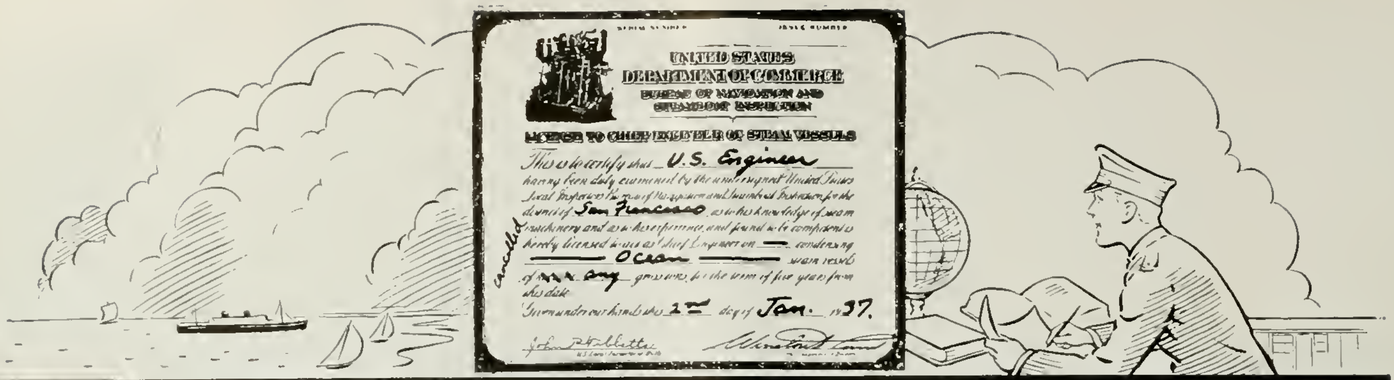
This table does not give measurements under "Types of Machinery," so we cannot compare accurately with the world tonnage figures. Percentage of numbers of vessels under the various types gives: Reciprocating steam, 62.5 per cent; steam turbines, 31.7 per cent; and diesel engine, 5.8 per cent.

As of December 1, 1938, there were under construction in American shipyards seagoing vessels of this 2000 tons or over class to the number of 45, with an aggregate gross measurement of 397,230 tons, or an average gross measurement of 8800 gross tons.

During December contracts to American shipyards in the seagoing classification of 2,000 tons or over totaled 15 vessels of 117,900 gross tons, making a total now building of 60 vessels of 515,220 gross tons.



Outboard profile of the fish survey vessel H. B. Scofield, now building for the California Fish and Game Commission at the San Diego Marine Construction Co.



UNITED STATES
DEPARTMENT OF COMMERCE
BUREAU OF NAVIGATION AND
STEAMBOAT INSPECTION
LICENSE TO CHIEF ENGINEER OF STEAM VESSELS
U.S. Engineer
San Francisco
Ocean
any
2nd Jan. 1937.
Cancelled

Your Problems Answered

by "The Chief"

The word "Cancelled" was inscribed on face of the above license at the direction of the Bureau of Marine Inspection and Navigation. As used here it means "Specimen Copy."

Steam Condensers (continued)

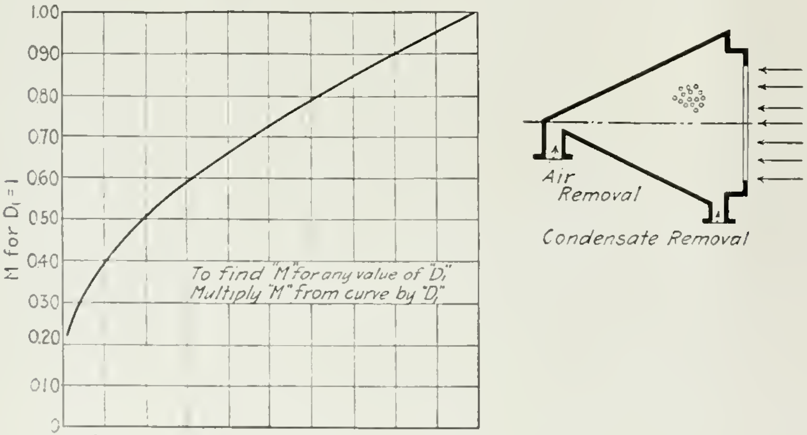
Question: Why is the condenser considered one of the most vital parts of the marine steam plant?

Answer: No one unit can so seriously damage or improve the plant. It is a heat exchanger like the boiler but cannot use such a large temperature drop to accomplish the heat transfer. While not subjected to the temperatures of the boiler, it is subjected to the corrosive effects of sea water without a protective coat of paint. Sufficient temperature differences are available to require careful design, such as floating tube headers or other expansion mediums. Properly designed and operated it can add greatly to the efficiency of the steam cycle, hence of the plant.

At moderate steam pressures as much energy is available below atmospheric pressure as is available from boiler pressure down to atmospheric.

Question: What are the primary functions of the surface condenser?

Answer: They are: to reduce the back pressure of the engine's exhaust to the lowest effective value; to conserve and return to the boilers the water of condensation, chemically pure and free from dissolved oxygen; to conserve and return to the steam cycle as many heat units as possible.



Figs. 1 and 2.

Question: What are the particular requirements governing the four mediums handled by the condenser?

Answer: Steam. Steam should enter the condenser and be conducted freely to all parts with the least possible resistance or pressure drop. It should have a high velocity because the heat transfer is greater, but not too high, particularly at entrance, as erosion of tubes from entrained water may result, and also too high velocity give corresponding high pressure drop. The velocity should be kept up to the entering value. This requires a constantly reducing area as the steam progresses along its path into the condenser. This accounts for the reduced spacing of tubes along the steam path.

Air and other gases are very poor heat transfer agents and blanket the tubes when trapped in pockets. It must therefore be pushed along with the steam, cleared from tube surfaces, collected at suitable place, freed from water as much as possible, cooled to reduce volume, and removed.

Condensate should be cleared from tubes, as water also impairs heat transfer. It should be collected in the condenser hot well freed from air or dissolved oxygen, and returned to the cycle at the highest possible temperature.

Circulating water should pass through the tubes with the least possible friction, hence power loss; have uniform velocity to prevent eddies and sudden pressure changes; have the highest practical velocity through the tubes and still remain smooth flow, as high velocities increase heat transfer; absorb the maximum amount of heat possible for the conditions involved; flow on the counterflow principle, that is, as far as possible steam and water should flow in opposite directions, which requires two or more passes through the tubes.

Eddies or any other condition different from a smooth streamline flow cause erosion of the metal of tubes or condenser.

Question: What are the resistances to heat transfer in a condenser?

Answer: There are three principal resistances: (1) vapor to metal; (2) through the metal; and (3) metal to water.

Roughly, the metal to water is about 2/3 of the total and vapor to metal almost the entire remaining 1/3. The metal resistance is usually very low relatively.

Question: What affects these resistances of heat transfer?

Answer: The metal to water heat transfer varies with the velocity, or, roughly, to double the water velocity we double the heat transferred.

The gage of metal and its nature will widely affect its resistance, but being a relatively small factor corrosion, erosion and strength determine these characteristics. The total resistance may not be changed over 5 per cent by tube thickness and material.

A slight scale on the water side of the tubes will be very noticeable. 10 mils of scale (.010″) will increase the total resistance by as much as 30 per cent.

On the steam side an oil film of 5 mils (.005″) will account for as much as 1/3 of the total added to the clean tube values.

Condensate drip on the tubes forms a noticeable resistance, which is another reason for maintaining a high steam velocity throughout the entire steam path to blow the water off as much as possible.

The most flagrant added resistance to heat flow is under the control of the operating engineer. This is the entrained air and gas. Some may come over with the steam; most will leak in at the auxiliaries. It blankets the tubes and stops heat transfer entirely.

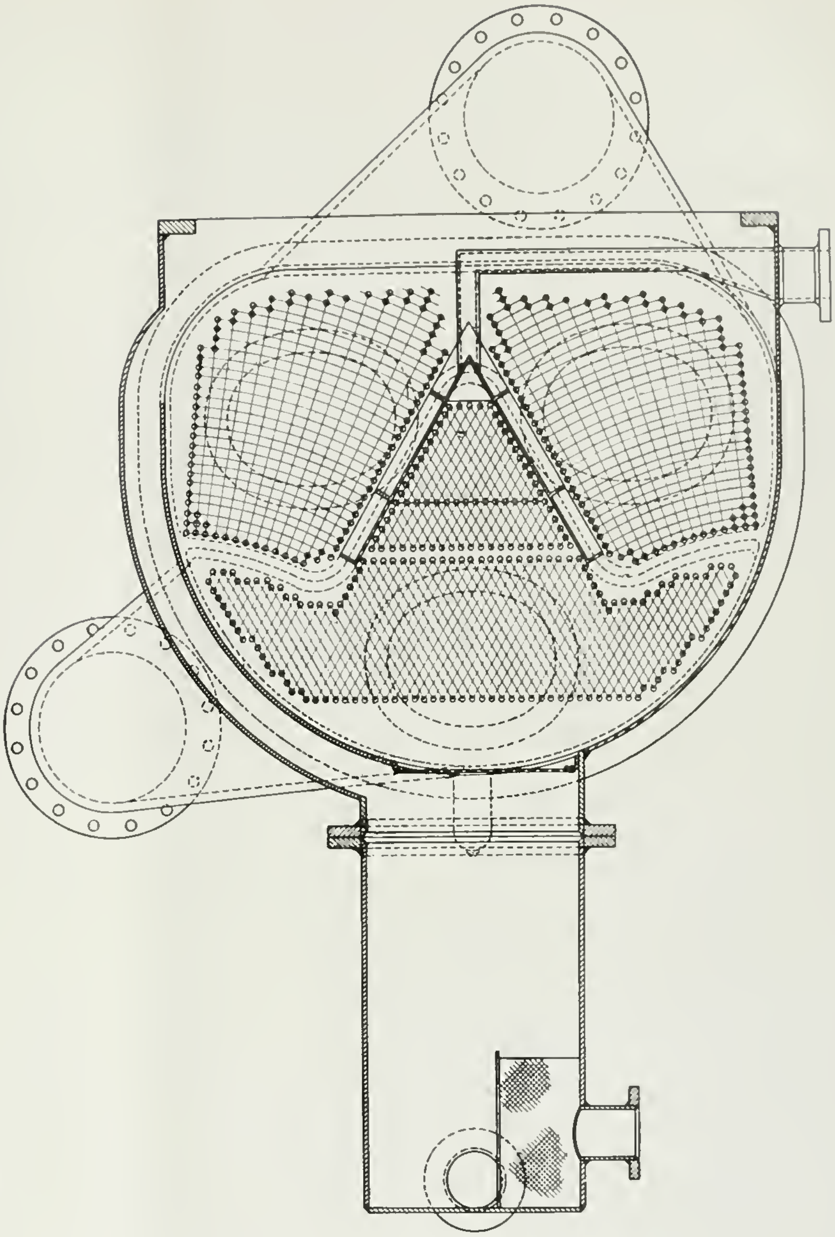


Fig. 3.

Question: What is the rate of heat transfer commonly used?

Answer: Good design and operation should be able to transfer the following B.T.U. per hour, per square foot of tube area, per degree F. At 2 feet per sec. water velocity about 400 B.T.U. and:

3 feet per sec. 480 B.T.U.
4 feet per sec. 550 B.T.U.
6 feet per sec. 660 B.T.U.
8 feet per sec. 750 B.T.U.
10 feet per sec. 830 B.T.U.

The reason for the rapid increase in transfer with water velocity is the sweeping away of the hot film and replacing it with cool film of water more rapidly. However, while it is true that to double water velocity may increase heat transfer 50 per cent, it also increases pumping H.P. about 8 times, as power usually increases as the cube of the velocity. Therefore design is a compromise between pumping costs and condenser costs. Also too high velocity gives broken flow, particularly just after water enters tubes, causing erosion of tube metal.

Question: What is considered the desirable temperature difference between the water and steam?

Answer: This was discussed and curves shown in our last issue. This brings out the extreme importance of the counterflow principle. Theoretically the water could leave at the temperature of the incoming steam and the steam could be condensed at the temperature of the incoming water.

Practically the temperature difference is taken as a rather complex mean between the diffrences at entrance and at leaving.

Let D_1 represent the temperature difference in degrees F. between the steam entering and the water entering the condenser. Let D_2 represent the difference in temperature degrees F. between the condensing steam and the water leaving. Let M represent the mean temperature to be used in calculations. D_1 will always be more than D_2. $\frac{D_2}{D_1}$ will be a fraction or decimal.

Then the curve, Fig. 1, shows the mean temperature for each degree F. of D_1. Thus, for 29" vacuum steam is 79° F. Assume water at 60° F. D_1 difference is $79 - 60 = 19$. Neglecting pressure drop in condenser steam condenses at 79° F. and D_2 is $79 - 70 = 9°$ F. $\frac{9}{19}$ is .47, and from curve the mean temperature is $.71 \times D_1 = .71 \times 19 = 13\frac{1}{2}°$ F.

Question: What is the most desirable shape for a condenser?

Answer: To maintain steam velocities as the volume reduces with condensation the theoretically best shape is shown in Fig. 2, a V shape. This same result may be partly obtained by reducing the tube pitch, and is largely obtained by the modern condenser, Fig. 3.

Question: How does the modern marine condenser take care of all these factors?

Answer: Refer to Fig. 3, which is a cross sectional view of the Foster Wheeler Corp. condenser on the new tanker S.S. Associated.

Note first the circulating water enters and leaves at the same end, or double pass. The inverted V section in the center is a baffle, the steam entering at the top passes downward outside the walls of the inverted V baffle until it enters the bottom section of tubes. Thence it turns upward into the open of the inverted V. The steam should be nearly all condensed by this time, leaving the tubes in the V to condense the remainder and to cool the air and gases which are drawn off at the point of the V.

Note also that a portion of the incoming steam is led off from the entrance at the top and around the left hand side (in this view) to the condenser hot well. This puts an atmosphere of exhaust steam over the condensate in this hot well and reheats it materially as well as condensing much of the steam. The reheating drives off much of the dissolved oxygen.

Our next article will open up the general subject of the auxiliaries.

Question From Aboard Ship

. . . a year ago there appeared in the Pacific Marine Review a graph showing relative values of propeller data, such as slip, speed and r.p.m. Can you send me a copy? What is the explanation of the graph and how constructed?

F. M. H.
New York, N. Y.

Answer: Three copies have been mailed to address given. Additional copies available on request to "The Chief," Pacific Marine Review, 500 Sansome Street, San Francisco, Calif.

The explanation of the method of construction of this chart is rather involved for this section. If there are sufficient requests, however, we shall devote an issue to this subject. Suffice to say it is a slide rule in a different shape, requires logarithmic scales, and is called a nomographic chart.

Engineers' Licenses

The following list shows the licenses granted during the month of November to engineer officers of the merchant marine at Pacific Coast offices of the Bureau of Marine Inspection and Navigation:

Name and Grade	Class	Condition
SEATTLE		
Joseph F. Drumheller, Chief Eng.	OSS, any GT	RG
Alexander S. Hidell, Jr., Chief Eng.	OMS, any GT	O
William F. Foley, 1st Asst. Eng.	OSS, any GT	RG
HONOLULU		
Louis R. Hickson, 3d Asst. Eng.	OSS, any GT	O
SAN PEDRO		
John A. Flanagan, Chief Eng.	OSS, any GT	RG
Hugh B. Hotchkiss, 1st Asst. Eng.	OSS, any GT	RG
PORTLAND		
Henry M. Harrell, Chief Eng.	OSS, any GT	RG
Perry D. Blanchard, 2nd Asst. Eng.	OSS, any GT	RG
SAN FRANCISCO		
Frank Coleman, Chief Eng.	OSS, any GT	RG
Guy F. Christian, Chief Eng.	OSS, any GT	RG
Robert S. Anderson, Chief Eng.	OSS, any GT	RG
Paul F. Christopher, Chief Eng.	OSS, any GT	RG
Carl E. Petersen, Chief Eng.	OSS, any GT	RG
Bernard R. White, Chief Eng.	OSS, any GT	RG
Ludwig Pelikan, 1st Asst. Eng.	OSS, any GT	RG
Clyde M. Braden, 2nd Asst. Eng.	OSS, any GT	RG
Peter Farquhar, 2nd Asst. Eng.	OSS, any GT	RG
Charles E. Smyly, 2nd Asst. Eng.	OSS, any GT	RG
Estul F. Nessmith, 2nd Asst. Eng.	OSS, any GT	RG
Albert E. Ingram, 2nd Asst. Eng.	OSS, any GT	RG
John C. Gray, 3d Asst. Eng.	OSS, any GT	O
Paul F. Christopher, Chief Eng.	OMS, any GT	O
John W. Roman, 3d Asst. Eng.	OMS, any GT	O

Abbreviations: GT is gross tonnage; RG is raised grade; O is original license; OSS is ocean steamer; OMS is ocean motorship.

Steady as you go!

KNOWLEDGE IS THE STRAIGHT COURSE TO ADVANCEMENT

A DEPARTMENT FOR DECK OFFICERS

AIR-BORNE DAMAGE TO SEA-BORNE CARGOES

(Continued)

By OLIVER D. COLVIN, WERNER H. E. HAHNE and MARK R. COLBY

(Editorial Note: This is the second installment of a masterly paper on this subject read before the annual meeting of the Society of Naval Architects and Marine Engineers, New York, December 1, 1938. The first installment outlined the properties of atmospheric air as a mechanical mixture of gases and other ingredients, and particularly as to its moisture-carrying properties and its behavior under changing temperatures.

This second installment takes up the effects of these atmospheric properties on various kinds of cargo and the stowage thereof. The two installments cover the general subject of "Moisture and Moisture Transfer in Cargo.")

The Moisture Equilibrium Chart

The vapor pressure in lumber depends not only on its moisture content, but also on the actual temperature of the lumber. As an example, when a piece of lumber containing 10 per cent of moisture is heated from 70 degrees to 90 degrees, its vapor pressure will rise from a 52-degree dew point to a 73-degree dew point. When the same piece of lumber is cooled from 70 degrees to 50 degrees, its vapor pressure is reduced from a 52-degree dew point to a 32-degree dew point, without having changed its moisture content.

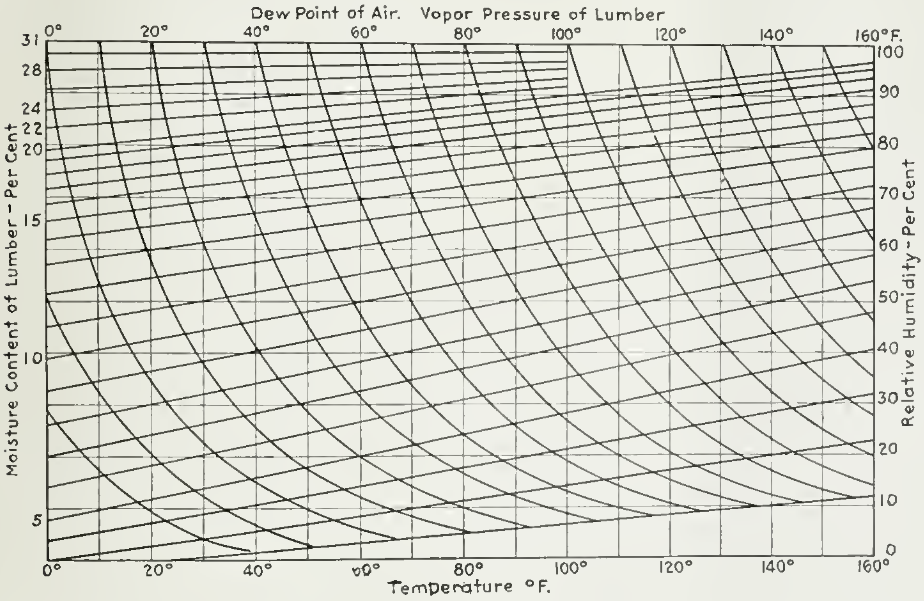


Fig. 2.

The relations between moisture content, temperature relative humidity and vapor pressure for one particular product can be reduced to the form of a moisture equilibrium diagram. Fig. 2 is the diagram for lumber which is taken from the book "Kiln Drying of British Columbia Lumber" by J. H. Jenkins. The vertical curved lines have been drawn in the diagram and represent lines of equal dew point, or, which is the same, lines of equal vapor pressure; for instance, lumber of 101 degrees and 4 per cent moisture content has the same vapor pressure as lumber of 70 degrees and 12 per cent moisture content and the same vapor pressure as air of 60-degree dew point. This means that warm and relatively dry lumber near a hot bulkhead will be in equilibrium with cool and somewhat damp lumber of the same parcel, which may be near the cool sides of the ship, and no moisture will tend to diffuse from one part to the other. For the purpose of cargo stowage this chart for lumber may also be used with reasonable accuracy for the following products: Wheat, rice, soap, wool and jute.

The products made of these have often different characteristics than the parent materials; for instance, paper differs from lumber, and flour differs from whole wheat. It is be-

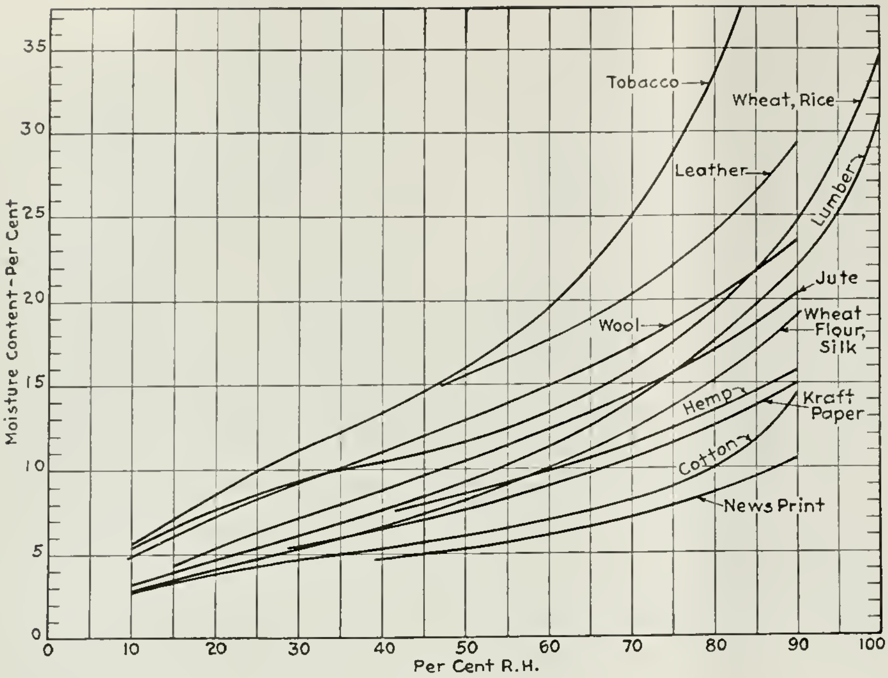


Fig. 3.

lieved that the hulled kernels of grain are more hygroscopic than the bran, but information obtainable thus far is incomplete and contradictory. Fig. 3 gives the moisture equilibrium data of a number of other commercial products at the temperature of 75 degrees. We note from the diagram for lumber that the equilibrium moisture content does not vary greatly with different temperatures, as long as the relative humidity in the ambient air remains constant.

Based on Fig. 3 and using the same temperature gradient as the one found for lumber, Fig. 4 for wheat flour has been drawn. The specific gradient for this and other products will be established more accurately in the future.

The purpose of these charts is to illustrate how such charts may in the future become very helpful in the correct stowage for hygroscopic goods. When the moisture content of one particular cargo is known and the temperature of a warm bulkhead near which it is to be stowed is also known, the vapor pressure of this parcel can be established. When this datum is compared with the probable outside temperature during the voyage and with the vapor pressure of other cargo in the same cargo hold, the cargo officer will be in a position to state whether or not the cargo near the hot bulkhead is likely to give off a great deal of moisture with resulting damage by moisture condensation or absorption by cooler parcels.

It should be noted that much work remains to be done in this respect, but it is felt that the above method will open the way toward a more scientific treatment of cargo stowage and also toward more scientific investigations of damage cases, than has been hitherto customary, when much is left to individual guess work.

● The Speed of Moisture Transfer

The rapidity with which moisture will evaporate from or be absorbed by cargoes depends largely on the following factors:

(a) The difference in vapor pressure between the product and the contacting air.

(b) The contact surface between product and air.

(c) The air motion over the surface of the product.

(d) The amount of air in proportion to the amount of cargo with which moisture is being exchanged.

As an example, when kernels of wheat are spread thinly on a tray with the air kept in lively circulation over the tray, an equilibrium between moisture in grain and in air will be obtained after a few hours. On the other hand, a bag of grain well ventilated will take about one week and the same bag kept in still air may take several weeks in order to obtain the same vapor pressure throughout and in the contacting air, provided, of course, that other disturbing factors do not enter the process.

● Amount of Cargo vs. Amount of Air

When cargo in a ship's hold is ventilated with air, an exchange of moisture will take place between them as has been explained above. The air leaving the cargo hold will be different from the entering air, and the cargo, which has been contacted by the air, will also have changed.

The degree to which cargo and air

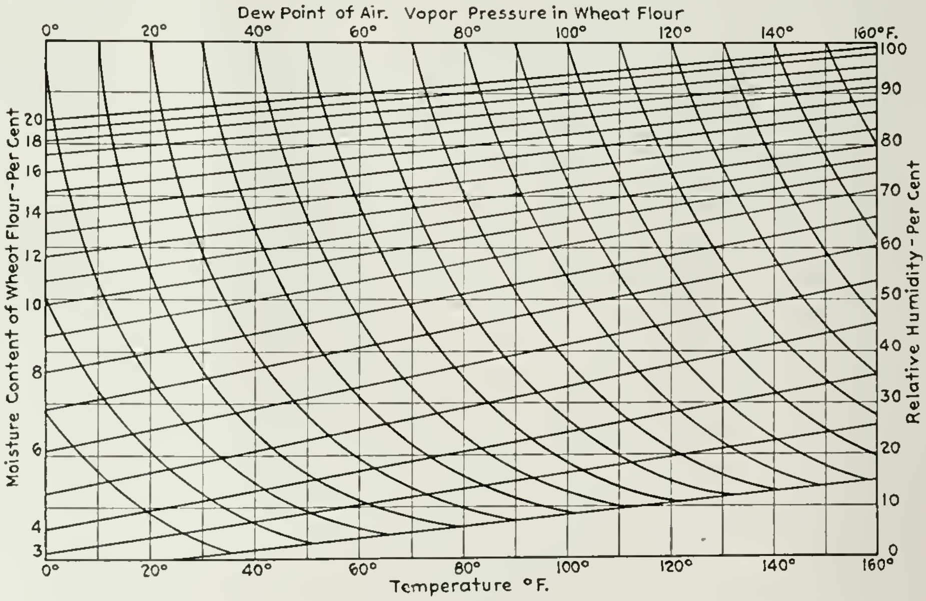


Fig. 4.

are changed depends entirely on their respective amounts involved. In comparing ventilating air with cargoes, the weight of the air should be compared with the weight of the cargo involved. Two examples will illustrate this point.

(a) One ton of bulk or bagged wheat contains about one pound of air in its interstices. A mere 100 grains of moisture will materially change the condition of the trapped air, but it will not noticeably affect the ton of wheat.

(b) Under favorable wind conditions, about 90 tons of fresh air pass through a large cargo hold during one day. This amount of air is sufficient to change materially the condition of the cargo with which it was in contact, but 90 tons of air may give off or take on several hundred pounds of moisture without changing its condition materially.

RECENT CHANGES OF MASTERS

Marine Exchange, San Francisco

Steamer W. H. Berg: Joseph Fox; vice, Don Thomson.
Steamer Paul Shoup: M. M. Melam; vice, R. W. Kelly.
Steamer Lurline: Burns A. Richardson; vice, A. Rognes.
Steamer Alabaman: E. J. Anderson; vice, J. M. Thompson.
Steamer Edgar F. Luckenbach: T. G. Eckart; vice, W. Kelly.
Steamer Associated: Robert W. Kelly; vice, L. E. Hawkins.
Steamer Hawaiian: S. A. Gates; vice, A. O. Forsyth.
Steamer Curaca: C. T. Moritz; vice, N. N. Richter.
Motorship Charlie Watson: A. W. W. Markley; vice, Joseph Fox.
Steamer Currier: H. H. Rees; vice, E. H. Bluhm.
Steamer D. G. Scofield: A. H. Koshkin; vice, A. W. W. Markley.
Steamer Chipana: N. N. Richter; vice, C. J. Holland.
Steamer W. H. Berg: Don Thomson; vice, Joseph Fox.
Steamer El Segundo: H. Bleumchem; vice, L. J. Williams.
Steamer Kewanee: F. W. Rosvally; vice, O. E. Lilly.
Steamer S. C. T. Dodd: L. J. Williams; vice, G. O. Johnson.
Steamer Captain A. F. Lucas: O. B. Petterson; vice, H. O. Bleumchem.
Steamer Mana: L. D. Vick; vice, O. Bergman.
Steamer La Placentia: O. S. Carlsen; vice, Yttergaard.
Steamer Point Caleta: E. Landbeeg; vice, G. Hagberg.

Deck Officers' Licenses

The following list shows licenses granted during the month of November to deck officers of the merchant marine at Pacific Coast offices of the Bureau of Marine Inspection and Navigation:

Name and Grade	Class	Condition
SEATTLE		
Richard Kreutzer, 2nd Mate	OSS, any GT	RG
John W. Crawley, 3d Mate	OSS, any GT	O
Edward L. Hart, 3d Mate	OSS, any GT	O
HONOLULU		
Nicholas Barbara, 3d Mate	OSS&OMS, any GT	O
JUNEAU		
*James W. Adams, Chief Mate	OCWSS&OCWMS, any GT	RG
SAN PEDRO		
Gordon F. Kariger, Chief Mate	OSS, any GT	RG
Frederick P. Rogers, Chief Mate	OSS, any GT	RG
John C. Young, 2nd Mate	OSS, any GT	RG
Alrik H. Larson, 2nd Mate	OSS, any GT	RG
Harry G. Hutman, 2nd Mate	OSS, any GT	O
Robert A. Grimes, 3d Mate	OSS, any GT	O
Aaron A. Isaac, 3d Mate	OSS, any GT	O
PORTLAND		
Almer W. Beale, Jr., 2nd Mate	OSS, any GT	RG
SAN FRANCISCO		
Charles H. Mead, Master	OSS, any GT	RG
Clarence P. Viveiros, Chief Mate	OSS, any GT	RG
Laurence W. Borst, 2nd Mate	OSS, any GT	RG
Walter J. Lewin, 2nd Mate	OSS, any GT	RG
Frank P. Martinkus, 3d Mate	OSS, any GT	O

*This license also gives to its bearer the right to act as First Class Pilot on the waters of Southeastern and Southwestern Alaska. It is the first such combination license to be issued.

Abbreviations: GT is gross tonnage; RG is raised grade; O is original license; OSS is ocean steamer; OMS is ocean motorship.

Literature of the Industry

The procession of bulk oil tankers powered with compound geared turbines using steam at around 400 lb. gage pressure and 750° F. temperature continues. One of the latest to go into service is the 13,000 deadweight tonnage Pan Maryland, described in a leaflet which is being distributed by the De Laval Steam Turbine Co., Trenton, N. J., builders of the propelling units, turbo generators and feed pumps. This, with her sister ship Pan New York, both built by the Federal Shipbuilding & Dry Dock Co., and the Pan American Pan Amoco, built by the Sun Shipbuilding & Dry Dock Co., makes four such oil carriers operated by the Pan-American Petroleum & Transport Corporation. On her trial trip the Pan Maryland averaged over 13 knots at 90 r.p.m. propeller speed. At this speed the turbines are rated at 3000 S.H.P., but they are also capable of developing 3300 S.H.P. at 93 r.p.m. At normal speed, the high pressure turbine turns at 6000 r.p.m. and the low pressure turbine at 5000 r.p.m. The two reductions of the double reduction gears are combined in a single casing, resulting in a considerable saving in space and weight.

MARINE ELECTRICAL PROGRESS

By H. C. COLEMAN

Manager, Marine Electrical Engineering, Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

At the close of each year for the past ten years it has been the practice to review briefly the advances made in the application of electrical apparatus on shipboard. A study of that record discloses a steady broadening of the field of application and shows the great importance of electricity in our marine industry. As we come to the close of 1938 we again pause in retrospect and find much progress to report.

● Diesel Fire Fighter

The diesel electric system of propulsion has again made history. One of the most interesting installations was on the new fireboat Fire Fighter, which was placed in service by New York City.

This vessel has a power plant consisting of 2-1500 H.P., 750 r.p.m. main diesel engines, each driving three generators, one rated at 900 K.W., one rated at 170 K.W., and the third at 40 K.W. The two propellers are each driven by a 1000 H.P. single armature motor. There are four fire pumps, each having a capacity of 5000 g.p.m. at 150 lbs. pressure, and each is driven by a 600 H.P., 1500 r.p.m. motor. An elaborate control system was provided, the central point of which involves a complete set-up switch control group, comprising a number of cam operated switches manipulated by a single handwheel. By means of this handwheel it is possible to make the proper field and armature connections for the various combinations of generators and motors. For instance, when going to a fire, the set-up is arranged so that each 900 K.W. generator supplies full power to one of the propulsion motors. Power for excitation and auxiliaries is taken from the 40 K.W. generators. When the vessel arrives at the scene of the fire, the set-up is changed by turning the handwheel so that each 900 K.W. generator supplies power to two of the pump motors while each of the 170 K.W. generators supplies energy to one propelling motor, giving sufficient power to maintain the position of the vessel and to maneuver as required.

The set-up, which can be changed in a few seconds, is also arranged so that operation may be had with only one main engine running. The system of propulsion control makes use of a combination of the variable voltage scheme and variable engine speed. When starting up, the engines are operated at half speed. Movement of the control lever, either in the pilot house or engine room, through the first half of its travel gradually increases the generator excitation, thus gradually increasing the propelling motor speed until full excitation is reached, and thus half voltage and half speed on the propelling motors. Further movement of the control lever gradually increases the engine speed until full speed of the engine is reached and hence rated generator voltage and maximum motor speed. Thus, if operating conditions require, for example, only 75 per cent speed on the propelling motors, the engines are always operated at 75 per cent speed with resultant economy and reduced wear.

Diesel-electric fireboat Fire Fighter of New York City.

● Save Weight and Space

The most interesting features of this installation consist of this combined engine speed and variable voltage control and the use of Class B insulation on the main machines, allowing 60° C. temperature rise on the windings and thus enabling a saving in weight and space which is extremely important on a vessel of this type where so much machinery is installed in a limited space.

The selection of electric propulsion for this vessel was influenced by the success of the electric drive furnished by Westinghouse for the New York City fireboat John J. Harvey, which was placed in service in 1930. This vessel was propelled by 2-1065 H.P. motors and carried five gasoline engine driven generating units.

● Diesel Tugs—and Ice Breakers

More tugs have been equipped with diesel electric propulsion than any other class of vessel, and almost every year sees the addition of new boats of this type. This year the Navy Department completed at the Boston Navy Yard a tug of this type, propelled by a 600 H.P. double armature motor, supplied with power from two diesel engine driven generators rated at 200 K.W. The installation was noteworthy because of the very compact and flexible dead front control unit. It also is representative of the present tendency toward the use of higher speed engines. These engines operate at 500 r.p.m. continuously.

Construction was completed this year of the diesel electric propelling equipment for four U. S. Coast Guard cutters of tugboat size, used for ice breaking and harbor work. Each vessel will be provided with a power plant consisting of 2-650 H.P., 750 r.p.m. diesel engines each driving a 320-K.W. normally rated main generator and 25 K.W. exciter. There will be one single armature direct connected propelling motor rated 800 H.P., 250 r.p.m. normally. The complete plant will be capable of providing 1000 H.P. on the propeller for ice breaking conditions.

● 3000 H.P. Electric Clutch Installed

An electro magnetic coupling rated at 3000 H.P., 400 r.p.m., was completed this year. This is an air gap coupling which transmits full torque electrically through the air gap and consists of two motor elements, one free to rotate within the other. One element or member is mounted on the shaft extension of the prime mover and the other member on the driven shaft. One element is excited from the ship's auxiliary direct current bus. The coupling is very rugged, efficient, economical of space, and simple, requiring only the operation of a switch to engage or disengage it. This type of coupling may be used to advantage between high speed diesel engines and reduction gearing where geared diesel engine propulsion is employed instead of full electric drive.

● Novel Centralized Control for Auxiliaries

During the year a number of interesting auxiliary electrical installations have been made. One of these involved the furnishing of the auxiliary motors and controllers for three cargo and passenger vessels being built for the Panama Railroad Steamship Co. For each vessel there was supplied a total of 89 auxiliary motors ranging from ½ to 50 H.P. For the control of these motors a novel arrangement was made consisting of mounting the controllers all at a central point in a structure similar to a switchboard unit with hinged doors making the structure dead front type. Type AB Deion 2 pole circuit breakers were mounted on the control panels with handles extending through slots in the dead front doors. Starting pushbuttons were mounted on the rear of the dead front doors, the buttons extending through and marked with suitable nameplates.

Group auxiliary motor control board with doors closed.

● Cargo Winches Improved

Further progress has been made during the year in improvement of cargo winch equipment. Operating characteristics have been improved and control simplified. Thirty-six equipments of this type using 35 H.P. motors have been built for the Panama Railroad Steamship Co. vessels and 84 equipments all using 45 H.P. motors are under construction for type C-2 ships being built for the Maritime Commission.

● New Tanker Development

Another interesting example of auxiliary equipment for which the apparatus is now being built is the complete motor and control installation, together with auxiliary turbine generator sets and switchboards, for high speed tankers being built for the Standard Oil Co. of New Jersey in conjunction with the Maritime Commission. This installation will be the first one utilizing a complete alternating current system for geared turbine propelled tankers. Each ship will have two turbine generator sets rated at 500 KVA., 240 volts, 3 phase, 60 cycles.

Work was completed on the construction of four 600 K.W., 240-120 volt turbine generator sets which will furnish auxiliary power and lighting for the new transatlantic liner being built for the U. S. Lines for operation in the same service as the highly successful Manhattan and Washington.

● Many Trends Noticeable

In the marine electrical developments for 1938 some definite trends are noticeable. Among these may be mentioned the use of group control for auxiliary motors on large vessels and the use of A.C. auxiliaries for tankers. In connection with diesel electric propulsion, the tendency is toward the use of higher speed locomotive type of engines and operating on a system of combined variable voltage and engine speed control. In this connection there is also a trend toward the use of Class B insulation on propelling motors and generators, with attendant higher operating temperatures in order to obtain lighter weights and saving in space on vessels where this is required. For auxiliary power and distribution switchboards and panelboards there is a definite trend toward complete dead front construction, using Deion type circuit breakers instead of exposed knife switches and fuses.

Pilot house of tug Dauntless No. 12.

All Welded Steel Tug Dauntless No. 12

Enterprise Engine Built in San Francisco Powers Latest Tug for New York Harbor and Offshore Service

The most recent addition to the diesel driven fleet of tugs servicing the port of New York is the Dauntless No. 12, of the Dauntless Towing Line Inc. of New York. This vessel is of all steel construction electrically welded throughout, was built by Jakobsen and Peterson Inc. of Brooklyn, and has the following principal characteristics:

Length overall	86'6"
Length B.P.	82'0"
Molded beam	24'0"
Molded depth	10'10"
Fuel capacity	300 bbls.
Service without refueling	20 days
Propulsion power	600 S.H.P.

Her hull is built with extra heavy plating and framing for 25 feet at the bow so as to be usable for ice breaking if required. The hold is completely filled with tanks and machinery spaces, all quarters being in the deck house.

Three bulkheads divide the deck house into four compartments. From bow aft these four compartments house: 1st, the galley and mess room; 2nd, two rooms paneled in plywood and fitted with berths for crew; 3d, the top of engine room space; and 4th, two rooms paneled in plywood and fitted with berths for crew.

In the pilot house erection are the captain's quarters and the wheelhouse, both of which are finished in hardwood paneling. Navigating equipment is of the most modern type furnished by T. S. and J. D. Negus. The electro-hydraulic steering gear was supplied by the American Engineering Company.

The galley is equipped with an Ingle oil burning range and with a General Electric electric refrigerator.

The tug Dauntless No. 12 on her trials in New York Harbor. Her San Francisco-built Enterprise diesel engine came through with a very fine performance.

• Propulsion Machinery

An Enterprise fully reversible mechanical injection diesel engine of the D.M.Q.-6 type directly connected to the propeller shaft supplies Dauntless No. 12 with a dependable 600 shaft horsepower at 250 r.p.m. Propeller thrust is taken on a Kingsbury bearing. This engine has six cylinders of 16 inch bore and 20 inch stroke. This is the engine that has earned a fine reputation for reliability and economy in many Pacific Coast tugs and larger fishing boats. It is of modern design, simple, rugged, and very easy of maneuvering and reversing.

Cylinder block and housing are cast integrally and liners are separate insertions. Operation is on the four cycle system. Inlet exhaust and injection valves are operated by push rods which in turn are actuated by cams on a shaft supported by bearings inside the housing, and accessible through removable plates on the housing front.

Fuel injection is by the Bosch system, with an individual pump for each cylinder. A Manzel mechanical lubricator supplies oil to each cylinder.

A high and low speed governor is built into the engine and acts on the fuel supply so as to maintain engine speed between certain limits for each setting of the throttle. This control provides for starting and operating at very low speeds, which is an important feature in towboat operation. Fuel oil is carried in thwartship bunkers with a capacity of about 45 tons, from which it is pumped to a day service tank of 100 gallons capacity. This bunker capacity enables Dauntless No. 12 to be on service approximately 20 days without refueling.

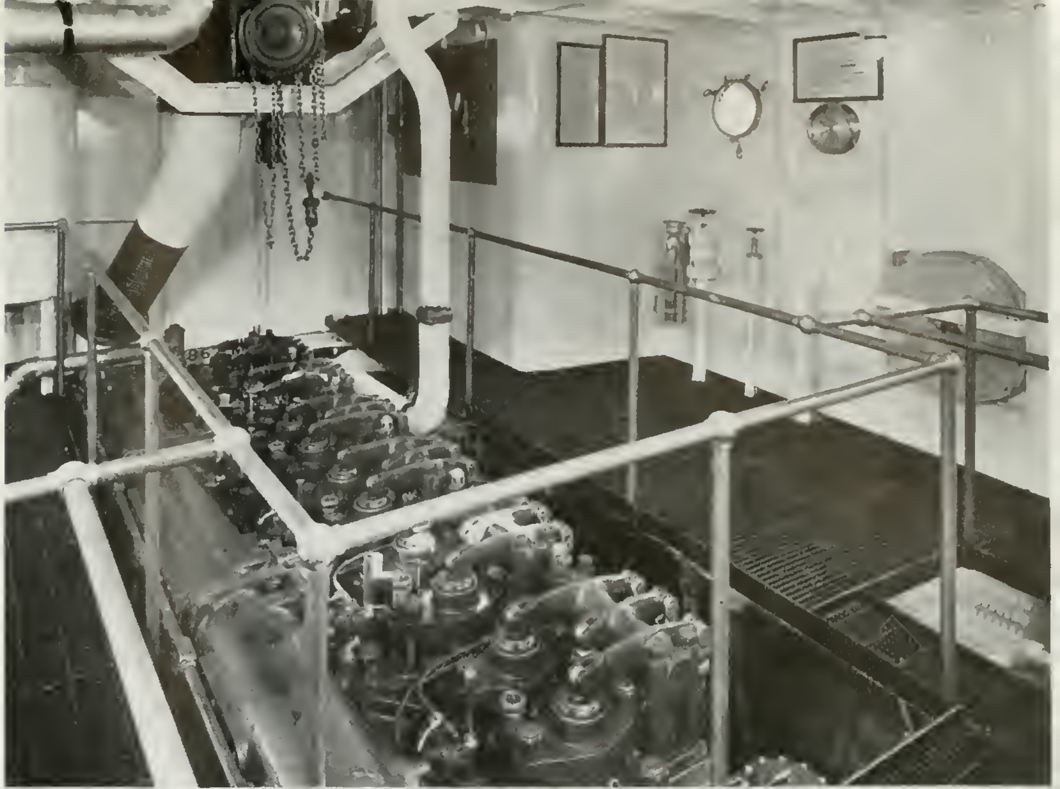
All bearings are pressure lubricated, using a dry sump system. The oil in this system is kept in proper condition by a Model 315-S.H.V. Gould's Hydroil centrifugal oil purifier fitted with a 3 KW electric heater, and is replenished when necessary from a 200 gallon storage tank.

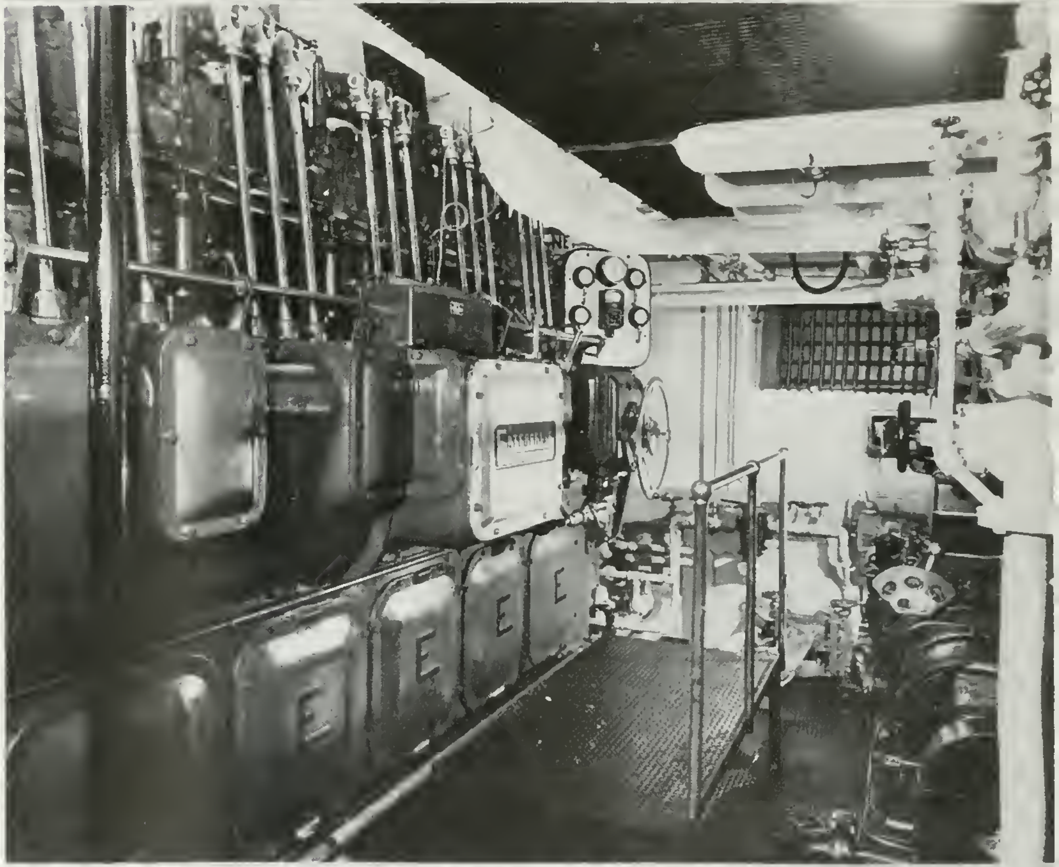
Reversing may be controlled manually by the use of the handwheel or through a Servo-air motor actuated by a small hand lever. In either case the actual reversal is accomplished by sliding the camshaft so as to bring the sets of reverse cams under the tappets operating the push rods.

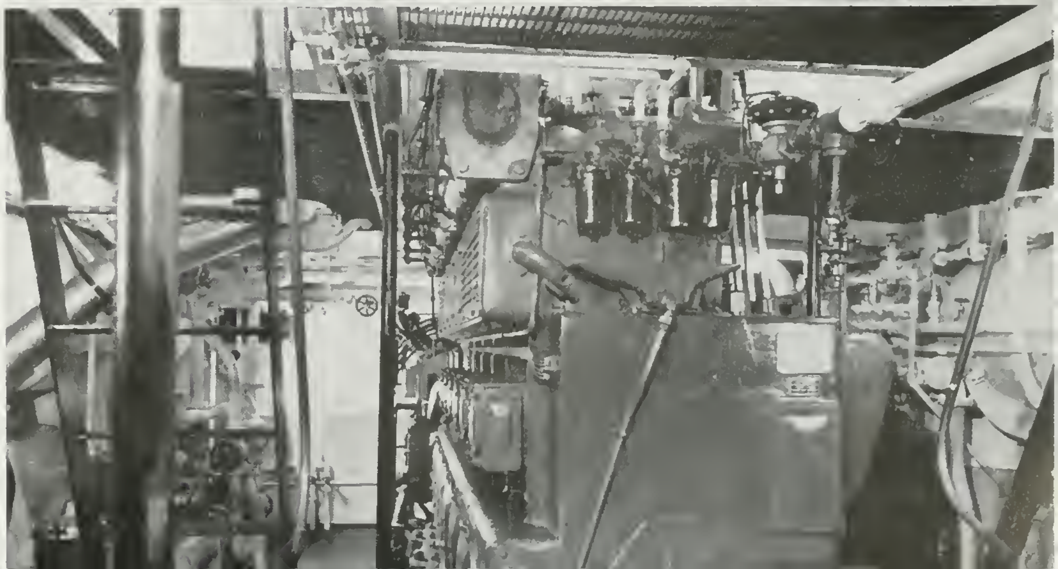
Cylinder cooling is effected by a built-in closed fresh water circulating system in which the fresh water is in turn cooled by salt water in a Shutte-Koerting heat exchanger.

A 12 KW, 125 volt electro-dynamic d.c. variable speed generator is driven by "V" belt off the main engine. This generator maintains full capacity and voltage over a wide range of speeds and supplies the electric power necessary when the tug is under way.

A Superior diesel generating set of 20 KW capacity is also installed. In addition there is installed an Ed-







Three views in engine room of Dauntless No. 12. Upper shows tops of cylinders; center shows starboard side and operating platform; lower shows after end of engine.

ison nickel iron alkaline 125 volt storage battery of 225 ampere hour capacity. This battery automatically picks up the load if either generator fails.

Compressed air is furnished by two Gardner-Denver air compressors, one driven by "V" belt off the main engine and the other by electric motor.

As will be noted in the illustrations, the Enterprise Engine is of sturdy, rugged design, simple of control and pleasing in appearance. On trials in New York harbor this engine performed to the full satisfaction of owners and crew, and Dauntless No. 12, built in Brooklyn, engined from San Francisco, and preparing food for the crew on a range built in San Diego, is pulling and pushing around the harbor ships operating under every maritime flag.

NICKEL AND ITS ALLOYS ABOARD SHIP

By ROBERT C. STANLEY

Pres. International Nickel Company Ltd. of Canada

Because of the eternal problem of corrosion, which is associated with all phases of ship operation, recognition of the corrosion resistance which nickel possesses and which it can impart to other metals with which it is alloyed, is the stimulus for an ever widening use of nickel in building, powering and outfitting ships of all classes.

For special purposes nickel clad steel plates are already being used in ship construction, notably for the refrigerated holds of seagoing trawlers. These plates, which combine the strength and economy of steel with the corrosion resistance of a pure nickel surface, are now replacing the traditional wooden fishholds in modern seagoing trawelers, because their better properties of sanitation and of refrigeration have definitely reduced spoilage in bringing fresh fish to market. It is said that the introduction of nickel clad steel for the holds is the first important step in the development of equipment for offshore fishing since the designing of the Grimsby-type trawlers a generation ago.

A development similar in objective was the construction this last year of an ocean going tanker with five main cargo tanks, each of 120,000 U. S. gal. capacity, lined with sheets of pure nickel for the bulk transportation of lye to makers of rayon, toilet soaps and other products requiring for their manufacture large amounts of pure caustic. Built near Rochester, New York, this pioneer tanker has already demonstrated the efficiency of her tanks by transporting "water white" kerosene on the Great Lakes. With the close of transportation on the lakes for the season, she proceeded to the Port of New York for outfitting for permanent service betwen North Atlantic and Gulf ports. More than 60,000 lbs. of nickel sheet were spot welded to the framework to form the cargo holds of this one ship.

● Cupro Nickel

An alloy with constantly broadening uses in modern marine construction is a cupro-nickel combination containing 70 per cent of copper and 30 per cent of nickel. First, introduced as the material for condenser tubes, this alloy is now being extensively adopted for pipe lines handling sea water for flushing, fire and sanitary services as well as for drain pipes. Other uses are in valves and fittings for salt water lines, and for tube sheets and sea chests. A welding electrode of the same composition has been developed to supply a need in welding this alloy.

● Use of Monel

Monel continued to broaden its field of applications in marine construction. Two new 148-ft. tuna fishing boats were equipped with the largest monel propeller shafts ever installed, the shafts being 7-11/16 inches in diameter by 21 ft. in length. High silicon monel of a hardness above 300 Brinell, which is non-galling and resistant to steam erosion and corrosion, is used for valve trim, seats, discs and wedges; and turbine control valve bushings and auxiliary turbine steam inlet nozzles are cast in silicon monel.

Cast monel impellers for pumps handling either salt or fresh water on ship board are being more widely used than ever. Storage tanks for boiler feed water are monel to avoid contamination of the water by rust, and to permit of lighter weight construction by eliminating allowance for thinning through corrosion in service.

During 1938 the first solid monel condenser water chest was bought by a foreign navy, practically all of whose recent ships have some monel turbine blading in service. The same alloy has been specified recently for drinking water tubes.

The large liner Pasteur, now being built in France to replace the Atlantic, will feature a number of interesting monel applications, including all table tops, service tables and other galley equipment; piping for beer in the various bars throughout the ship; high pressure valves, and so forth.

Twenty - five monel propeller shafts, two and one half inches in diameter and about 21 feet in length and said to be the largest ever produced on the Continent, have been forged in France for use with 1,000 H.P. engines.

"K" monel is used in the neighborhood of compass and other magnetic instruments because of high strength and non-magnetic quality, and there are other uses of this alloy in marine sound devices.

● Machinery

Anchor chain, both cast and forged, is now more commonly made of nickel steel, three and one-half per cent nickel steel being used for the forged chain and a nickel-chromium-molybednum composition for the cast. Propelling shafts for large ships are either nickel steel or chromium nickel steel. Special high alloy steels with nickel content ranging from eight to twenty-six per cent are used for certain types of

(Page 49, please)

Running Lights of Pacific Shipping

As
Reviewed
from the
1938 Editions
of

PACIFIC MARINE REVIEW

In presenting this review of the Running Lights of Pacific Coast Shipping, the publishers of Pacific Marine Review salute these leaders and express their most sincere thanks for their loyalty and friendship over the years.

To these men—and to all our readers—our sincere wishes for a prosperous 1939.

ARTHUR H. ABEL

Port Manager and Chief Engineer of the Port of Oakland, is now in his seventh year as Chief Executive of the Port of Oakland. From 1926 to 1932 he held the position of Assistant Port Manager and Assistant Chief Engineer to Mr. G. B. Hegardt, Port Manager and Chief Engineer of the Port and previous to that time was associated with Mr. Hegardt, during the period 1910-1926, in the carrying out of a major port development project at the Port of Portland. Prior to 1910 Mr. Abel was engaged in extensive railroad engineering and construction operations in the northwest. He is a graduate of Washington State College.

Despite the demands made upon him by his work at the Port of Oakland, Mr. Abel has found time to serve as President of the Pacific Coast Association of Port Authorities for the year 1939 and is active in the following organizations: American Association of Port Authorities, Committees on Standardization and Special Research, and Port Practices, Rules and Terminal Rates; United States Aeronautical Chamber of Commerce, Airport Survey Committee; and the League of California Municipalities, Committee on Municipal Airports. He is also an associate member of the American Society of Civil Engineers.

CAPT. STANLEY E. ALLEN

For quarter century marine department Standard Oil Company of California . . . through the deck department of his company's tankships . . . now serves as Safety and Fire Prevention Engineer out of the busy 14th floor department headed by Joseph McEachern and Charles Robertson. Spark plug of Propeller Club of California, he has been Secretary under ten administrations.

GEORGE A. ARMES

President and general manager of General Engineering & Dry Dock Company since its organization in 1921. Formerly chief engineer Army Transport Service, 1901 to 1904. Assistant engineer-in-chief at Bethlehem's Union Plant, 1904 to 1909. Engineer-in-chief 1907 to 1917. Shipping Board officer. President, Moore Shipbuilding Company, 1917 to 1921. A yachting, golfing, hunting enthusiast.

CAPTAIN CHARLES A. BERNDTSON

Master of the Lurline. Matson has just conferred the rank of Commodore upon him . . . hoisting the "white star on blue field" to the foremast of his command on November 12, 1937. Boy and man, a true sailor. To sea at 14 as deck boy on a Norwegian bark. Joined Matson as quartermaster of the old Manoa. Received honors for Atlantic transport service in World War . . . was youngest Lieutenant Commander in U. S. N. R. Has skippered 10 different Matson ships during 21 years with the company. The Lurline has known no other master.

COL. W. C. BICKFORD

General Manager and Chief Engineer, Port of Seattle . . . received his engineering education in South Dakota. Came West in 1907 and engaged in highway, railroad, construction work. As Snohomish County Engineer, laid some of the state's first pavement. Entered World War service with 63rd Coast Artillery as Captain. Returned home as Lieut. Colonel. For 10 years head of a building materials business in Seattle . . . served as chairman Adjudication Board . . . president, Seattle Construction Council . . . Supt. of Buildings . . . Consulting Engineer for Pacific lumber interests. Became General Manager of the Port in January, 1935. He has so administered Seattle's maritime affairs as to win respect and esteem of men throughout the Coast.

F. E. BOOTH

President of F. E. Booth Company, Inc. Founder of the sardine industry, he established first plant in Monterey, 1898. Products of his present-day plants, millions of tons annually, are shipped universally. Rugged, hale . . . he trails moose and caribou in Canadian wilds. His office walls are heavy with evidence of his markesmanship.

HARRY BROWN

President of Interocean Steamship Corp. since its origin, 1930. Born in San Francisco, his career has always been associated with traffic. The Southern Pacific, C. & H. Sugar, Dyson Shipping Co. are previous connections forming his background. His line operates in regular service to the U. K., the Continent, the Orient, South America. His golf game, improving . . . his poker, scientific.

MICHAEL J. BUCKLEY

Vice president in charge of traffic of American President Lines . . . he need bow to none as authority on cross-Pacific—round-the-world cargo movements . . . Born and schooled in San Francisco. One of the original South of Market Boys. Joined Pacific Mail in 1902. With Dollar for 16 years. Our readers will remember his inspired poem "A Day at the Farm" (P.M.R., December, 1937). A hiker . . . and he hikes!

RAMOND F. BURLEY

Freight traffic manager McCormick Steamship Company. Under the circle M houseflag for 16 years . . . three years previously with Parr-McCormick. Authority on foreign trade. Self-described "World's greatest baseball fan!" His library on the national sport probably most exhaustive extant. Born in Hayward (across the bay). Lives in San Francisco. Plays Sunday soft ball with his 12-year-old daughter.

W. S. BURNETT

Vice president and general counsel, Hammond Lumber Company . . . a leader in the industry on the Pacific Coast. Attorney with general law practice in San Francisco . . . partner in the old firm of Page, McCutchen and Knight . . . till 1910—then with Hammond. Retired for some years in 1925, resuming as vice president in 1936. A native of Ireland, he greets you with true Irish hospitality. Going back to Erin soon, too, to revisit his family and some of the old places and faces. Hobbies . . . dogs and appreciation of music.

DREW CHIDESTER

Of General Steamship Corp., Ltd. Born in Memphis, when 9 years old moved his parents West. Horatio Alger career: from $15 per month office boy to executive vice president, managing 9 services —engaging 83 ships in world-wide services. His mentality alert. Remarkable asset, his smile.

DEARBORN CLARK

Traffic Manager of American-Hawaiian Steamship Company. Scion of seafaring stock, he started with A-H in boyhood . . . has progressed through all departments of traffic . . . on Atlantic and Pacific seaboards. His hobby: unravelling the complexities of contract bridge.

JOHN CLERICO

Port Engineer of McCormick Steamship Company. Joined the line in 1923, promoted to present berth two years later. Son of Kansas, he served machinist apprenticeship in Santa Fe shops, Topeka. Went to sea early . . . shoreside with NELSECO . . . with Morse yard at Brooklyn . . . back to the engine room and up the ladder! His golfing prowess noteworthy.

JOHN E. CUSHING

Makes our spotlight position this month! Upon elevation of Roger D. Lapham to Chairman of the Board, former executive vice president Cushing is appointed president of American-Hawaiian Steamship Co. Headquarters of both executives remain in San Francisco. Long recognized as outstanding shipping leader. A Stanford grad . . . born in Marvelous Marin . . . broad experience with major San Francisco operators.

KENNETH D. DAWSON

Vice president of I.M.M. and head of the various subsidiaries on the Pacific Coast. Headquarters San Francisco. His services requested by the U. S. Shipping Board back in World War time . . . then president of Columbia Pacific Shipping for eight years . . . later organizer of States Steamship Company. Still rates Portland one of America's Edens . . . but San Francisco!

L. M. EDELMAN

Supervisor of Marine Sales, Associated Oil Company. A Philadelphian by birth. Seventeen years with Associated Oil . . . ahead of that with U. S. Naval Auxiliary Service; war-time service with Naval Reserve. Since the days he was a student of the Pennsylvania Nautical School, he has been actively interested in schoolship administering work . . . served on the Board of Governors of the California Nautical School and today his principal hobbies are school-ship and sea-scout welfare. Capt. Edelman is president of the Naval Reserve Officers Association. President of Pacific Coast Insecticide Association. Lives across the bay in beautiful Piedmont. There's a son who tops six feet.

GEORGE EGGERS

Was appointed last month to the post of Examiner for the occupational research division of the United States Maritime Commission at San Francisco. The naming of this Coast-reared, Coast-trained marine man was hailed by his friends up and down the seaboard . . . friends who knew him back in the old Pacific Mail days . . . friends who have followed his career through the years. His background in capsule form: Joined Grace in '05. Worked with John Rosseter from '14 to '18 on U. S. Shipping Board. Operating Manager of "Mail Company" till '21. Thence to Norton, Lilly & Co., at Puget Sound and Columbia districts . . . '23 to '26. Operating Manager of States Steamship and finally, ahead of U.S.M.C. appointment was operating manager of Sudden & Christensen at San Francisco. Born in Alameda . . . and still resides there! His hobbies are ships and the men that run them.

FRANK FOX

General Superintendent of the Shops of General Engineering & Dry Dock Co. "15 years with George Armes!" A real Georgia cracker. Member Olympic Club . . . but too busy for golf. Peninsula commuter, he has an attractive home 30 minutes away from Sansome Street. Keen, alert, regular fellow . . . he has hosts of friends in marine-industrial circles.

HENRY E. FRICK

Vice President in Charge of Operations, American President Lines. This recent appointment brings to the Coast this former Easterner who has enviable career record with Shipping Board and Maritime Commission. (Chief of the Construction and Inspection Service, U. S. M. C. . . . his most recent post.) Born in Baltimore. Early shipbuilding experience in Belfast, Ireland. Supervisor of hull construction work for Maryland Steel Company of Sparrows Point, Md. With Fore River Shipbuilding Co. During 1936 and 1937 he was associated with Phelps Bros. & Co., Inc., of New York, steamship brokers and operators. His technical background—his operating experience, a happy combination for his new post with A. P. L.

WILLIAM GROUNDWATER

Director of transportation, Union Oil Company . . . a distinctive figure in national marine circles, he was recently chosen president of Pacific American Tankship Association. Headquarted in Los Angeles, he is a frequent visitor to Bay area, where his company's tankers carry the crude to Oleum.

EDWARD H. HARMS

Assistant operating manager, McCormick Steamship Company. Berkeley born . . . attended Berkeley Hi . . . thence to U. C., where he still occupies niche in Baseball Hall of Fame . . . crack pitcher during college years. Started lumber and steamship career with Nelson Line . . . to McCormick in '25. Marine committee Junior C. of C. President Propeller Club of California during '37. Secretary San Francisco Steamship Dinner last voyage. His loyalty, sincerity, born leadership will carry him to the top!

HANS HALVORSEN

Port Captain for Union Oil Company of California, first became associated with the company in 1914, when he was signed on as a seaman on the S.S. Lansing. During his next three years at sea, in various capacities and on various vessels of the fleet, he utilized his spare moments so effectively in study that by 1917 he had received his mate's license. Immediately thereafter he was assigned as third mate to the S.S. La Brea, and by 1919 had risen to the position of first mate on the S.S. Los Angeles. His first appointment as master was on the S.S. Warwick, when she was taken over by Union Oil Company from the U. S. Shipping Board in 1923, and for a number of years subsequently he served as relieving master on other vessels of the fleet. He was appointed to his present post—Port Captain—on January 10, 1927.

H. T. HAVISIDE

Heads the Pacific Coast's largest fleet of salvage and derrick barges, also the ship supply house of Haviside Company. Harry's experience in salvage operations goes back 41 years. A long list of craft have been saved from disaster through the work of the Haviside salvage fleet. H. T. has two sons, Russell and Byron. Russell is manager of the ship chandlery division, while Byron is following in his father's footsteps in the salvage and heavy lifting operations of the historic firm. H. T. was Propeller Club president in 1934. His Barge No. 5 has figured in many waterfront celebrations. Countless Pacific Maritimers value his friendship and rank him an authority in his chosen field.

V. W. HOXIE

Babcock & Wilcox marine boiler authority with Chas. C. Moore & Company, Engineers at San Francisco. "Joe," as a host of loyal friends hail him, has steamed up many a power plant over the past 40 years! And he's witnessed some remarkable trends in marine engineering. Born in San Rafael. He rounded out his technical education back at Stevens Inst. of Technology . . . returning to S. F. in '97. Hobbies? Well—if you'd call grape-growing to the tune of twelve carloads annually a hobby—he's got one! The vineyard is at Lodi, where Joe and his "pal," Mrs. Hoxie, have a grand ranch house for their week-ends and vacations . . . (and friends!) Member of the A.S.M.E. since 1915 . . . and of the Society of N.A.M.E. since '24; he has countless friends on both coasts and his Eastern visits are great reunions of maritime notables. A B. & W. man since 1898.

RAY C. INGRAM

Supervisor, marine fuel oil sales, Union Oil Company of California. In U. S. air service during World War. Began petroleum career in wildcat fields of Montana in 1919 . . . geological surveying, then production. Has since served 17 years in nearly all phases of oil industry . . . 5 years in sales. Aviation enthusiast.

ERIK KRAG

Vice president Interocean Steamship Corp., managing agents for several U. K. Range lines, including the ANGER type motorships. Born in Denmark, his Viking heritage has always confined his career to ships and shipping. To San Francisco in 1914 . . . aided in establishing Interocean in '30. Marin County resident, he motors across the G. G. Bridge daily. Casts a mean fly . . . rides a mean horse!

F. W. KUTTER

General manager of Fred Olsen Line, began his career in shipping with G. W. McNear back in 1900. Organized the present service in 1915 with one ship . . . now six of them bear testimony of his success in the transportation field . . . running to Liverpool, London, Hull and Norway. No hobbies, but likes the great out-of-doors. Brought up in San Francisco . . . married.

NEIL S. LAIDLAW

Traffic manager for Swayne & Hoyt, Ltd., started steamshipping with old Pacific Coast Co. in 1914; U. S. Army, 1917-19; steamship business in Japan, 1919-1925; joined Swayne & Hoyt in 1926. S. & H. services: Gulf Pacific Line, Calmar Line, Yamashita Line. In Middle West Swayne & Hoyt are soliciting agents for Silver-Java-Pacific Line and Royal Netherlands. Neil was born in San Francisco; lives in Oakland. Hobby—home and garden.

ROGER D. LAPHAM

President for 31 years of American-Hawaiian Steamship Company . . . took two years away from the "helm" to serve as captain of the famous 77th Division overseas . . . as Food Administrator in London. Ardent traveler via dirigible, China Clipper, and ocean liner. Hobbies—golf, fishing.

C. M. LeCOUNT

Marine department, General Electric Company, San Francisco . . . President of Propeller Club of California. A Schenectady-trained man, he came to the Coast 23 years ago. Loves his fishing. Today finds him up in Scotia stalking steelhead. A golfing enthusiast, his ability as a handicapper usually keeps him off the fairway. Lives in the Berkeley hills. Two sons and thousands of friends call him "Dad."

JOSEPH A. LUNNY

Vice president and director of operations, McCormick Steamship Company. Born, educated in San Francisco . . . the waterfront his favorite haunt as a lad. Started lumber-shipping career with Oliver Olson firm in 1916. Joined the Marines in wartime. Cast his lot with McCormick in '18 down at Pier 7. His 20 years include posts as terminal agent in Wilmington, assistant operating manager, operating manager to present executive job in '35. Joe Lunny has been of inestimable help in solving shipowners' common problems . . . his ideas progressive. Hobbies . . . golf and his family; a wife, a daughter just entering her 'teens, a 7-year-old Joe, Junior.

EDWIN J. MACFARLAN

Export department, Standard Oil of California. Affectionately known to his San Francisco buddies (and their name is legion) as Eddie. Born here, and has worked for over thirty years for this big organization exclusively. His department's responsibility brings him into direct contact with shipping circles—dispatching sales carried by the 28-tanker fleet. Plenty of baseball in his youth. Sandlotted with these diamond notables: Ping Bodie, Babe Pinnelli, Harry Krause. You guessed it! He was a shortstop and a honey. Plays some golf . . . likes to swim. Lives in the Marina and there's a Mrs. and a son. Past president of Export Managers Club. Vice-president of Foreign Trade Association. Headed banquet committee, last month's big party. A colonel for several years in Community Chest.

W. EDGAR MARTIN

The Westinghouse marine department head in San Francisco. Born in Brooklyn. Has always worked for Westinghouse . . . always in marine department . . . the company trained him in engineering—heavy technical subjects at the U. of Colorado. (Graduate student course.) To the Coast with first turbine jobs many years ago. Lives down Peninsula. Married and a daughter Phyllis, who is a Stanford co-ed. Plays a sweet fiddle. Golf when time permits. Main hobby: Visiting new engine room jobs in his constant study of marine propulsion developments. He is "Eddie" to thousands of Coast maritimers!

JOSEPH H. McEACHERN

Manager of Marine Dept., Standard Oil Company of California. His career a convincing inspiration for the youth of today . . . he started as a cadet on the S.S. Ventura. With a chief's ticket his goal, his progress was rapid; engineered aboard Oceanic, Pacific Mail and good old Pacific Coast Steamship ships. His supers when aboard the State, the Queen, the Curacao, President, Governor, Senator, were (how many of you remember them?) August Kress . . . W. H. Allison. With Standard Oil for 25 years. In '13 a salesman in Stockton, then in Nevada. To Phoenix next as Asst. Mgr. During the war with Naval Reserve . . . Back to Phoenix , . . and in '19 appointed Dist. Sales Mgr. at Reno. Drafted to home office in '21 . . . various capacities in S. F. . . . organized Motors Vehicle Dept. Appointed to present executive post upon retirement of John C. Rohlfs. Lives in Marvelous Marin. Has a ranch on the road to the Geysers near Healdsburg.

J. F. McCONKEY

Pacific Coast manager for Sperry Gyroscope Co., Inc., joined this organization 19 years ago as service engineer. Opened Great Lakes station in 1919; started Seattle office in 1922; took over S. F. office in 1924; became West Coast manager in 1927. Expanding business now finds "Mac" directing sales and service in Pacific range—both marine and aviation equipment. Home is Burlingame. Hobbies, golf and bridge.

GEORGE B. McLEAN

Port Engineer for Union Oil Company of California, is a native of Aberdeen, Scotland, where he served his apprenticeship as a machinist. On the completion of this preliminary training, he went to sea and finally secured his chief engineer's papers. Before attaching himself to Union Oil Company, he had also served as chief engineer of a large power plant, and later as a foreman in the Bethlehem Shipyards at San Francisco. He was engaged by Union in 1919 to take charge of a marine repair shop operated by the company at Wilmington. In this capacity he displayed a thorough knowledge of the business, and supervised the operation of the plant so capably that when it was abandoned in 1923, he was appointed Port Engineer, and has continued to discharge the duties of that post efficiently until the present time.

GEORGE B. McLEOD

Vice president of Hammond Lumber Company, Hammond Shipping Company, Hammond Redwood Company. Associated with founder, Mr. Hammond, back on the Blackfoot River in Montana 46 years ago. His company principal operators of coastwise vessels in the lumber carrying trade.

CLARENCE HENRY MATSON

Manager, Department Foreign Commerce and Shipping of Los Angeles Chamber of Commerce. Formerly secretary-traffic manager, City of Los Angeles Harbor Department. Born in Ohio. Newspaperman at start of career. In June this year Dr. von KleinSchmid of U. of Southern California conferred upon him honorary degree of Master of Foreign Trade. Came to Los Angeles in 1907 as feature writer . . . specializing in study of transportation problems. One of the founders of Foreign Trade Club of Southern California. Married; he has two daughters, two sons, one of them a minister. Lives in Pacific Palisades. Grows very beautiful flowers. A leading force in the development of the Los Angeles harbor for 30 years!

EDWARD C. MAUSSHARDT

District representative, Pacific Coast District, U. S. Maritime Commission. For fourteen years engineering department of old Pacific Coast S. S. Co. . . . and Oceanic. Since 1919, executive work with Shipping Board and, in turn, the Maritime Commission. Soldiered in the Spanish-American fracas. The crack of the baseball bat is music to his ears. Motors to California's historic spots whenever leisure from his duties permits.

W. H. MAYBAUM

Pacific Coast passenger traffic manager of Panama Pacific Line, headquartered at San Francisco, has been with I. M. M. since 1911 . . . (the year he got his first job), passenger department in Cleveland for 3 years, Southwestern district P. M. in St. Louis 3 years, G. P. A. in charge of agency department for 8 years in New York, thence to Los Angeles as G. P. A. Took time out during big war to soldier with famous 105th Field Artillery (27th Division, New York). He was vice chairman of transportation of American Olympic Committee and personally conducted the team to Berlin in '36. He plays the Culbertson system—and expertly. He shoots "under a hundred." A glorious baritone voice has kept his evenings occupied . . . with the Orpheus Male Chorus . . . with the Apollo Club . . . and there's been an occasional "bit of radio on the side." A rare personality, San Francisco has already adopted him!

BERNARD MILLS

Superintending Engineer of the big 38-vessel American-Hawaiian fleet, he will round out 38 years with A-H in November. Ahead of joining this intercoastal line . . . in Auxiliary Navy Service—Spanish-American War . . . with U. S. Army Transport Service. In 1900 the A-H fleet was the Californian, built by Union in S. F. . . . the American, the Oregonian and the Hawaiian products of the Roach yard on the Delaware. Mr. Mills, considered the dean of Marine Engineering on the Coast, supervises A-H engine performances at Pier 28 on the Embarcadero. A resident of Danville, he grows walnuts and almonds. He's a seasoned commuter, motors daily through the new tunnel to the Key train in Berkeley. Mrs. Mills and two grown youngsters are "all well and happy!"

JOSEPH A. MOORE

President Moore Dry Dock Company of Oakland, Calif. His shipbuilding skill recognized universally, he has countless friends in England, Scotland, Atlantic seaboard. Motivating factor of Bohemian Club. His hobby—FRIENDS!

Addenda:

In December, 1938, Mr. Moore has returned to his San Francisco offices from Eastern conferences with U. S. Maritime Commission heads . . . reporting the award of contracts for the construction of two ships at the Moore yard in Oakland. These contracts are acclaimed as the beginning of a new era in Coast shipbuilding.

RALPH W. MYERS

President of Shipowners Association of Pacific Coast. Migrated from his native Oregon when 4 years old. For 33 years with steam schooner operators Hobbs-Wall. Dynamic—energetic—he has served many organizations as president . . . Purchasing Agents . . . Propeller Club of California . . . past master F. & A. M. (Charter Rock, Berkeley, 1916). A Key commuter to beautiful Claremont. Purser Sutton Myers of Matson liner Monterey calls him "dad!" And there's a daughter. Who has more friends than Ralph Myers? Not even Jim Farley!

HERMAN D. NICHOLS

Vice president of Tubbs Cordage Company. Firm produced first rope in 1856. H. D. joined in 1925 after two grueling years as a cement kiln burner. Has always inclined towards ships . . . voyages on a regular beaten track to plantations as far as the Philippines. A bridge commuter, he substitutes the auto radio news flashes for the morning paper. Career: from waterfront salesman to vice president in 12 years!

CHARLES R. PAGE

President of Fireman's Fund Insurance Company, genuine San Franciscan by birth and career. Joined F. F. marine department upon graduation from Yale. His intimate knowledge of ships and shipping brought him appointment by President Wilson as Commissioner of the U. S. S. B.; trustee of the E. M. F. Civic minded, he serves the S. F. Chamber of Commerce—U. S. C. of C.—Community Chest.

ALBERT O. PEGG

Superintending engineer of Union Oil Company. Headquarters in the L. A. Building, where he works closely with Wm. Groundwater, chief of transporation of the big U. O. tankship fleet. Bert Pegg has scores of friends in S. F. ship circles. Active member A. S. M. E. . . . also Society of N. A. and M. E. At present supervising construction of firm's new tanker at Bethlehem yard. Lives at Wilmington.

CARL E. PETERSEN

Assistant Manager, Construction & Repair Dept., Matson Navigation Co., since January 1, 1938. Formerly Asst. to V.P. of Newport News Shipbuilding & D. D. Co. Vast experience in marine engineering and naval architectural posts . . . including Army Transport Service . . . U. S. Shipping Board . . . U. S. Mail S. S. . . . supervised reconditioning of "George Washington," "America," etc. He was for 5 years naval architect, charge Const. Dept., U. S. Lines . . . his principal work: the conversion-reconditioning of several liners to cabin class. His education: Machine Design at Pratt Institute; Mech. Eng. at Tri-State College; and Polytechnic Inst. of Brooklyn (M.E. degree), U. S. Navy Steam Eng. School, Stevens Inst. Member: A. S. Naval Eng. ('17), A.S.M.E. ('18); S. of N. A. & M. E. ('15); Engineers' Club of N. Y. Many other technical societies. Commissioned as Lt. Comm. Volunteer Naval Reserve for Engineering Service. Now a real San Franciscan!

CAPTAIN A. F. PILLSBURY

Of the firm of Pillsbury and Curtis . . . nationally recognized naval architects. A down-Easter, Capt. Pillsbury commanded sailing ships in the 'Round the Horn days. A marine-salvaging authority. He headed the California Division of the U. S. Shipping Board during the Big Days. A true son of the sea, he enjoys panoramic view of the harbor from his skyscraper office in San Francisco. Lives in a veritable wonderland of flowers in the Berkeley hills.

THOMAS G. PLANT

Vice president of American-Hawaiian Steamship Company . . . born in New Jersey . . . joined A.-H. 31 years ago as assistant freight clerk on the American. Brought shoreside 2 years later and started upward climb, reaching position of operating manager in '23. Named vice president in '35. Established permanent waterfront employer associations. A yachting enthusiast, he has sailed often to the Islands in select racing competition. Lieutenant-commander in the U. S. Naval Reserve.

CHARLES H. ROBERTSON

Assistant manager, Marine Department, Standard Oil Company of California (he's "first" to Chief Joseph McEachern). With Standard for 23 years . . . including those grand days when Robert (Bob) L. Hague was a "Coast Defender." Has watched the constant development of the S.O. of Cal. fleet recently climaxed by construction of distinctive tankers W. H. Berg and H. D. Collier. President of Propeller Club of Cal. 1935. Married and a resident of Mountain View. Fellows like to work with him . . . and for him. His leadership inspires!

ALMON E. ROTH

President-executive of Waterfront Employers Association . . . Pacific American Shipowners Association. For 18 years comptroller of Stanford, which college he entered in 1908, working his own way through. Varsity football squad . . . crack relay man in track! Practiced law seven years. The Comptroller of Pacific Waterfront Employers' groups since March 10, 1937. Resigned this post during December, 1938, to assume executive leadership of newly organized San Francisco Employers' Council.

WILLIAM P. ROTH

President of Matson Navigation Company. Joined the firm during the regime of the late Edward D. Tenney. Became president in May, 1927, when Mr. Tenney was made Chairman of the Board. A Stanford grad . . . a Peninsula resident . . . a horse fancier. There's a William Junior and twin daughters: Berenice and Lurline.

HARRY S. SCOTT

President since 1921 of General Steamship Corporation . . . started his shipping career 45 years ago . . . sailing vessels for Barneson Hibbard Co. Few men in the last quarter century have played a more important part in upbuilding Pacific Coast foreign trade. With foresight and courage, plus his natural ability to organize men, has been instrumental in establishing one new steamship line after another. Formed Transoceanic Company in 1917 . . . later active in creation of General Steamship Corporation. . . . Had title of Cavaliere by order of Crown of Italy conferred on him in 1932.

WILLIAM H. SELLANDER

Passenger Traffic Manager, Matson Navigation Company. His birthplace, Benicia, Calif. Our "youngest pioneer"—he started with Captain William Matson as private secretary . . . his duties were varied along with the Captain's "adventures" in sailing ships, oil, pineapples . . . In those early days "all one family." The Matson ships carried limited numbers of passengers. With the arrival of the Enterprise the passenger business began in earnest . . . and W.H.S. was placed in charge. Ardent gardener and indulges his hobby in the Claremont hills of Berkeley. The Sellander iris is famous. An officer in the Alameda Garden Club. Chairman of the Committee which built . . . and now a director of—the Army and Navy "Y" on the Embarcadero. Member of Kiwanis. There's a wife and daughter.

JOSEPH R. SHEEHAN

President of American President Lines . . . who in the matter of a few weeks has captured the esteem and respect of Coast shipping men upon his advent from Eastern fields to the San Francisco post. A boyhood pal of Ambassador Joseph P. Kennedy in and around Boston, they played semi-pro baseball—prep school and college. . . . A Harvard alumnus cum laude of 1910. Served as captain of infantry in the big war . . . a year at the front. Mr. Kennedy drafted him from private business into the Securities & Exchange Commission in 1934 where he served two years, returning to his own business until he was named Executive Director of the Maritime Commission. At the helm of the reorganized Dollar Lines he is fast winning friends through his rare personality and natural poise. An excellent speaker, he has appeared before several traffic and maritime groups. Presided recently at the flag-raising ceremony aboard the President Coolidge. A delightful host!

GEORGE E. SWETT

President of Geo. E. Swett & Company, Engineers. Came "from the rock-bound Coast of Maine to the peaceful shores of California" via Schenectady. His home town also gave "berth" to the picturesque sailing ship Phineas Pendleton; his grandsire of Brewer, Me., helped build her. Apprentice and student courses with G.E. and to their Seattle office in 1913. Later, with Allan Cunningham, pioneer winch designer. To S. F. in '20. Later one of the founders of Western Engineering Co., supply firm which now bears his name. One of the West Coast's best posted marine men, his firm has engine room installations innumerable. Can golf with the best of you . . . and make it interesting!

CHARLES L. WHEELER

Executive vice president McCormick Steamship Co. and Chas. R. McCormick Lumber Co. Born in Wisconsin . . . came to Coast to prepare treatise on this area for dictionary firm . . . remained to sell "cutover" land. Started with McCormick at St. Helens, Oregon. To San Francisco in 1920 to organize lumber company's shipping interests. Named executive vice president in 1935. Has served as president of S. F. Rotary, District Governor and director of Rotary International.

HOWELL WARE

Managing director of Xzit Pacific Company. Headquarters in San Francisco—where, incidentally, he has spent his entire business career—covers the whole seaboard from Puget Sound to San Diego. Formerly sales manager of Pacific Coast Glass Company (now Owens-Illinois), he joined up with Jack Govan, the Xzit president, two years ago, incorporating the Pacific Coast organization. Past president of Rotary . . . and San Francisco Sales Managers Association. An exceptional sailorman when he boats . . . a Culberston disciple.

SYDNEY G. WALTON

Newly appointed General Passenger Manager of Matson Navigation Company. His elevation recently announced by William P. Roth, president, places him in charge of all Matson services. Mr. Walton retains his former position of Secretary of the big trans-Pacific fleet operators. He is a graduate of Massachusetts Institute of Technology. Joined up with the Matson Line in 1927 as Assistant to the President. Later was named Secretary of Matson Navigation . . . Oceanic Steamship Co. Also served as Secretary and Director of the O. & O. Nav. Co. "Syd" was born (this century) . . . in the city by the Golden Gate. He has a host of friends in travel circles . . . throughout America. Knows passenger traffic thoroughly and brings to his important new responsibility a lifetime's study of "passenger-preferred" service. Enjoys a commanding marine view from his home in San Francisco.

GEORGE D. ZEH

Manager of the marine department of Tide Water-Associated Oil Company's Associated Division with headquarters in San Francisco. Has a fleet of seventeen petroleum carriers in operation. Joined Associated in 1902 as stenographer. Next he was shipping clerk, then with field pipe lines. He was transferred to San Francisco in 1908 and since that time has been in "Transportation." Hobby—FLY fishing. Hails from Richmondville, New York. He resides in Alameda.

G. E. 1938

Marine Electrical Developments

By GUY BARTLETT

Not since the World War was the shipbuilding industry as actively producing new vessels as it was during the year. In the case of two tugs, a new type of drive—geared diesel-electric propulsion—was introduced.

● Turbine Drive

Among the turbine-driven ships put in service were some pioneering in the high-pressure, high-temperature field. The Altantic Refining Company placed in service two turbine-electric tankers that operate with initial steam conditions of 625 lbs. and 825 F. These are the highest steam conditions in the American merchant marine today, and are expected to enable the 4500-K.W. turbine-generator propulsion units to set new standards of fuel economy. A third tanker, under construction, will be like the other two except that the turbine will be designed for 900 F. operating temperature.

Two cargo vessels of the Philadelphia and Norfolk Steamship Company, the S.S. Quaker and S.S. Cavalier, developed over 18 knots on their trials. They are the highest-speed cargo vessels in this country. Each has a geared turbine, with normal rating of 4000 H.P. at 120 r.p.m. and maximum rating 5000 H.P.

On the Great Lakes the S.S. Ralph H. Watson and S.S. John Hulst were put into operation by the Pittsburgh Steamship Company. They are bulk carriers powered with 2000-H.P. geared turbines.

A dozen high-speed tankers, with top speed of 18 knots and capable of maintaining 16 knots, were under construction for the Standard Oil Company of New Jersey. Four shipbuilding companies are each supplying three of the ships. Those being built by the Federal Shipbuilding and Dry Dock Company are to have G-E propulsion turbines and gears. Each tanker will have twin-screw drive, with a 6750-H.P., 96-r.p.m. geared turbine per screw. Steam conditions will be 425 lbs., 740 F. and 1½ in. absolute back pressure. All auxiliaries will be driven by a-c motors from two 400-K.W., 230-V. turbine-generator sets on each vessel. The tankers will be 525 ft. long, 75 ft. in breadth, and 39 ft. depth, with draft of 29 ft. 10½ in.

Obsolete ships are being replaced by up-to-date cargo vessels in an extensive construction program of the U. S. Maritime Commission. Six cargo vessels capable of 16 knots are being constructed by the Federal Shipbuilding and Dry Dock Company, with geared turbines for propulsion. The vessels are single screw, 6000 H.P., 92 r.p.m., with steam conditions of 440 lbs., 740 F. total temperature, and 1½ in. absolute back pressure.

● Geared Diesel-electric Drive

Geared diesel-electric drive was introduced during the year in two tugs of the Moran Transportation and Towing Company—tugs which operate not only in New York harbor but on the high seas and on the New York State Barge Canal. Smoothness and flexibility of operation are required, and are supplied by the geared propulsion motors, which at the same time save weight, since higher speed motors can be used. Two geared propulsion motors deliver 1,000 H.P. to the propeller shaft, giving the vessel a speed of 13 knots. Current for the motors is supplied by two diesel-generator sets of 400 K.W. capacity each. Gear ratio is arranged to give the propeller a speed of 200 r.p.m. with the motors turning at 1200 r.p.m. The speed of the propelling motors is regulated by cutting in and out resistor units in series with the main generator fields, thus varying the generator voltages.

Late in the year work was started on three tugs which will be the most powerful with diesel-electric drive. Of 3,000 H.P. each, they, too, will have geared propulsion motors. Each will have four 750-H.P. motors. They are being built as U. S. fleet tugs.

● Shaft-horsepower Meter

For measuring the H.P. and H.P.-hr. being transmitted by a revolving shaft there was developed a meter which covers a range of shaft sizes and speeds, permitting its application to the propeller shafts of the majority of ocean-going cargo ships and passenger liners. The complete equipment consists of a generator unit which is assembled on the shaft, an indicating instrument which indicates the horsepower being transmitted by the shaft, and a meter which records the H.P.-hr. transmitted by the shaft over a period of time. It is entirely self-contained and requires no external source of power. Over a range from 30 to 120 per cent of rated shaft H.P. the indicated H.P. and the recorded H.P.-hr. are correct to within 2 per cent of rated values. The two-generator method of measurement is used, by which the twist in the shaft under load produces electrical phase displacement betwen two voltages proportional in magnitude to the shaft speed. The resultant voltage is proportional to horsepower.

Nickel On Shipboard

(Continued from Page 32)

valve trim. In marine steam turbines the rotor forgings are either nickel-molybdenum, nickel-chromium-molybdenum or nickel steel. Similar steels are used for flange bolts. The trend is more and more toward adding a small percentage of nickel to the 13 per cent chromium steel which is widely used for turbine blades, both impulse and reaction.

Motor Tankers
Imperial and Petrolite

Introduce New Electro-Magnetic Slip Coupling For Reduction Gear Drives

Bow view of tanker Imperial on trials.

To the casual observer watching trials of the Imperial in Collingwood Bay on November 21, or of the Petrolite a week later at Sorel, where the Richelieu River joins the St. Lawrence, there was little to indicate from the external appearance of these two ships that other than conventional design was being successfully demonstrated. However, to several score of qualified experts representing the owners, Lloyd's Register of Shipping, the United States Maritime Commission, the Canadian National Defense Council, and foremost ship and machinery builders, there was much to place them far in advance of present merchant ship design and construction, for these were commercial applications of a revolutionary type of marine drive with no mechanical connection or contact between main engines and the propeller shaft.

The Imperial and Petrolite are sister ships built from plans by the Imperial Oil Shipping Company's naval architect, Peter Duncan. Construction to Lloyd's Plus 100 A-1 classification was entrusted to The Collingwood Shipyards, Ltd., Collingwood, Ontario, and Marine Industries, Ltd., of Montreal, respectively.

Principal dimensions are:

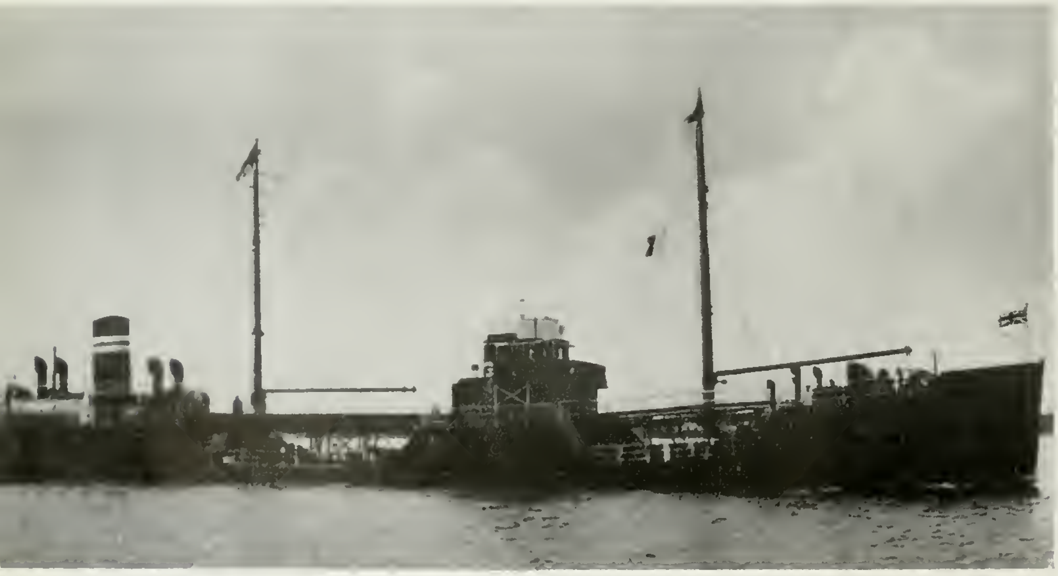
Length bet. perpendiculars	230′-0″
Beam molded	39′-0″
Draft molded	16′-10½″
Displacement (salt water)	3140 tons

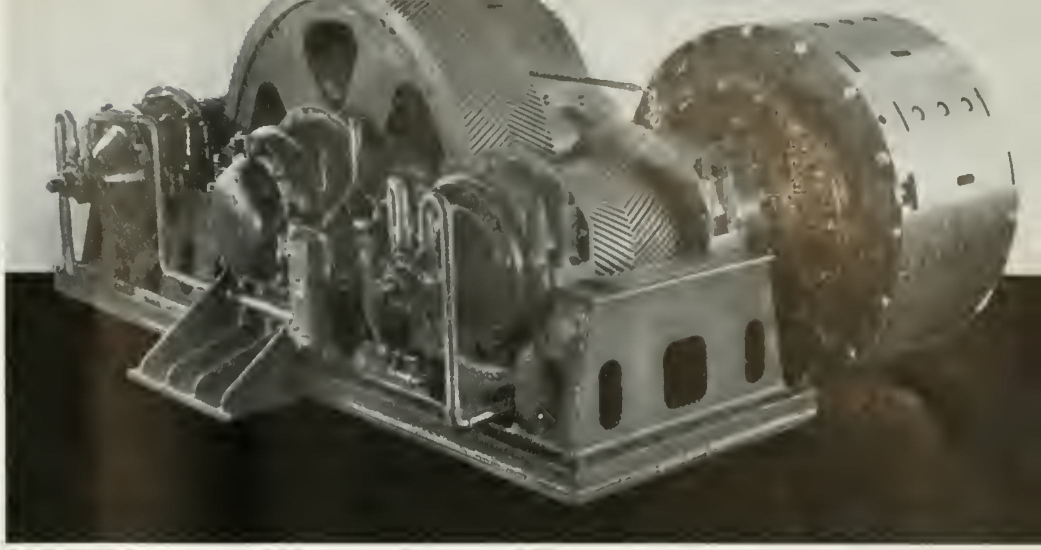
Guaranteed speed (well exceeded on the trial trips of both ships) was 11.25 knots with a cargo capacity fully loaded of approximately 14,000 barrels.

Particularly excellent jobs of welded hull fabrication were executed by both yards, and each vessel in turn was immediately accepted by H. J. Rahlves, vice-president and general manager of The Imperial Oil Shipping Company, at the conclusion of her respective trials. In fact, the owners' confidence in workmanship, materials and machinery was perfectly demonstrated when, after approximately seven hours of sea trials, the Petrolite was ordered to proceed at once to Tulara, Peru, for her first cargo assignment. The Imperial, also, was dispatched at once for her home port at Ioco, British Columbia, via the Panama Canal, where she will be inspected by interested United States naval authorities.

First available records of fuel consumption indicate that both vessels are remarkably economical in service. On the first run from Sarnia to Port Colborn the Imperial burned only 27 barrels of fuel oil as against 96 barrels formerly used by a steamship of comparable power and capacity. Similarly, from Montreal to Halifax each tanker consumed 105 barrels as opposed to 309 previously required for equivalent steam operation.

The engine room is located aft as is customary, and contains the usual auxiliary equipment, fire, sanitary, bilge and cargo pumps, all motor-driven. Both ships are equipped to carry mixed grades of oil or gasoline and are fitted with four cargo pumps, each of which, with its respective piping system, is independent of the others to insure complete flexibility for loading or unloading. A 100 H.P. oil-fired boiler provides ample steam for heating both crew quarters and cargo when necessary. Electric power for lighting and general service in port is furnished by a 3 cylinder, 30 H.P. Fairbanks-Morse diesel generator set operating at 1200 r.p.m. A 6 cylinder, 75 H.P. Gleniffer diesel generator set provides additional electric power when under way with the main engine generators uncoupled.


Broadside view of tanker Petrolite.



Farrel-Birmingham reduction gears and Elliott electro-magnetic slip couplings for tanker Imperial.

● Propulsion Machinery

The twin main engines for each ship were also furnished by Fairbanks, Morse & Company, Ltd. They are Model 37, 2 cycle, 7 cylinder diesels that develop 730 H.P. each at 400 r.p.m. They are placed in reversed positions to normal with drive shafts extending from both ends. Immediately aft of each engine and connected by pneumatic clutch is a 210 KW generator for supplying power to cargo pumps. These generators are disengaged while at sea.

Engine-mounted equipment includes an Alnor pyrometer, Weston tachometers, Maxim silencers and Nugent fuel oil filters. The remarkable propulsion drive is placed forward of the main engines and connects to the propeller shaft which is carried aft between the engines on three 18-inch white metal steady bearings.

● Electro-Magnetic Couplings

The main engine crankshafts are connected to the Farrel-Birmingham reduction gears through Elliott electro-magnetic slip couplings. These can be likened to induction motors except that both rotor and stator turn in the same direction and at substantially the same speed. The armature or inner member is rigidly mounted to the main engine crankshaft while the field or outer member is integral with the reduction gear pinion shaft. An air gap of ample proportions separates the two parts of the coupling.

Electric current amounting to about 1 per cent of the power transmitted is introduced to the field through collector rings and brushes. This sets up a magnetic flux which holds the outer member in practically constant relation to the armature regardless of its angular speed or direction. The well-known Elliott "double diamond cage" construction is employed to insure maximum torque with minimum current. Obviously, engine and gear are instantly uncoupled by throwing the proper switch on the engineer's control panel and demagnetizing the coupling.

● Reduction Gears

The reduction gears, supplied by the Farrel-Birmingham Company, Inc., are of the double pinion, single reduction type with a ratio of 3.2 : 1 to give an efficient propeller speed of 125 r.p.m. The pinions and their respective shafts are produced from heat-treated alloy steel forgings and the driving gear is of steel rim construction mounted on a casting of high tensile iron. The teeth of both pinions and gears are generated by well-known Farrel-Sykes process, which produces continuous herringbone teeth with a pressure angle of 20 degrees and a helical angle of 30 degrees.

All shafts are ground to finished dimensions with tolerances of plus .001″ and minus .000″. Accurate engineering and careful shop practice combine to give efficiencies above 98 per cent.

The welded steel case is simple, sturdy and rigid, with minimum weight consistent with strength. Aside from the Timken thrust bearing it is fitted throughout with SKF self-aligning roller bearings on both pinions and the main shaft forward.

Two inspection plates and the flanged design of the top provide complete accessibility for inspection and routine maintenance. Positive pressure lubrication protects all vital points regardless of the vessel's trim under any load conditions. A self-reversing pump and pressure filter with cooler integrally mounted assure plenty of clean cooled lubricating oil at all times. In this connection it is noteworthy that all lubrication requirements for all of the wide range of machinery installed on these ultra-modern vessels are satisfactorily met by various "Imperial" products. Similarly, Imperial diesel and boiler fuel oils are used exclusively.

The advantages of the Elliott electro-magnetic slip coupling and Farrel reduction gear drive are many and obvious. Tremendous savings in propulsion machinery space and weight result from the use of high speed multiple units. This results directly in greater earning power for the vessel through increased cargo capacity. Either diesel can be instantly uncoupled for any reason without stopping the ship, which proceeds under the power of the remaining unit.

Since there is no mechanical connection between engines and the propeller shaft it is impossible to have high frequency vibrations from the crankshaft or shocks from fouling the propeller transmitted beyond the coupling. Also, when calculating critical frequencies it is not necessary to consider the drive system beyond the coupling, which simplifies the problem materially.

Maneuvering in close quarters is greatly improved through the very low propeller speeds possible without a corresponding reduction in power. In practically all cases these vessels will be handled in the customary manner with the engine controls. It is possible, however, when maneuvering conditions warrant, to speed up response to bridge signals by holding one engine at half speed ahead and other at the same speed astern, with instant ship control effected by magnetizing or demagnetizing alternate couplings.

On the Ways -

SHIPS IN THE MAKING

LATEST NEWS FROM AMERICAN SHIPYARDS

Moore Dry Dock Co. Awarded Contract for Two C-3 Type 16½ Knot Steamers

On December 23 the U. S. Maritime Commission awarded the Moore Dry Dock Company of San Francisco and Oakland, California, a contract to build two C-3 type cargo vessels, thus breaking the long famine for Pacific Coast steel shipbuilders.

The contract price on these vessels is $2,857,760 for each ship, or a total of $5,715,520 for the two cargo carriers.

Following are the principal characteristics of the hulls:

Length O. A.	492′
Length B. P.	465′
Beam Molded	69′6″
Depth S. D.	42′6″
Draft Full Load	27′3″
Total Deadweight Cap.	11,036 tons
Displacement Loaded	16,725 tons
Bale Capacity Holds	650,000 cu. ft.
Gross Measurement	7,750 tons
Passenger Capacity	12
Shaft Horse Power	8,500
Sea Speed	16½ knots

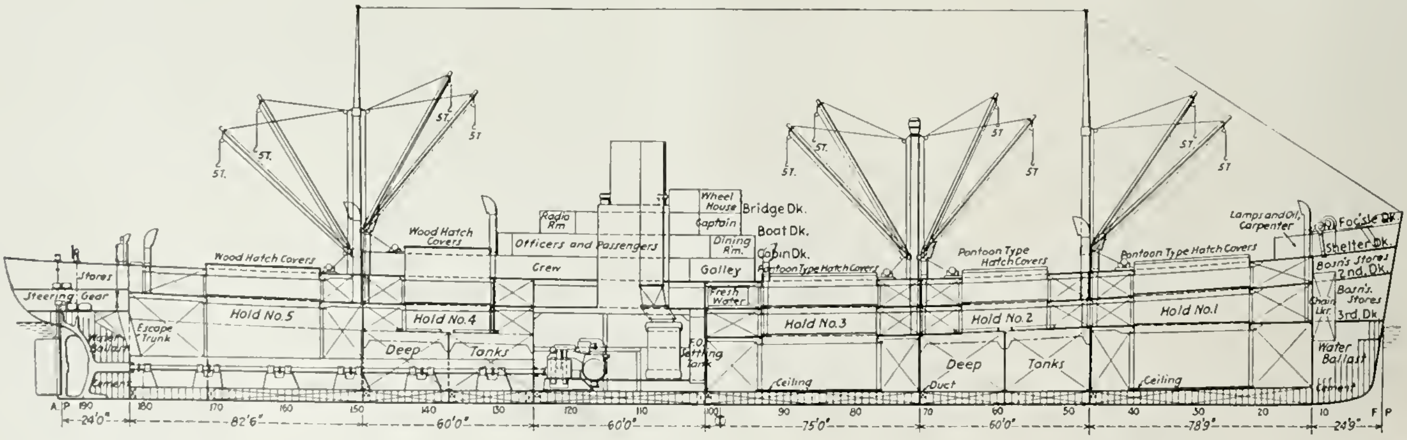
The design calls for a single screw vessel with a cross compound double reduction gear steam turbine taking steam from two water tube boilers at 450 pounds pressure and 750° F. temperature. Propeller speed at normal power is 95 R.P.M. The guaranteed consumption under normal conditions is to be 0.6 pounds of 18,500 b.t.u. oil per shaft horse power hour for all purposes including one of the turbo-generating sets operating under a load of not less than 200 K.W.

The electrical plant will include: two 250 K.W. turbo generator sets; one 7.5 K.W. diesel engine drive emergency set; a storage battery for picking up emergency load and starting diesel; a 20-volt storage battery for the interior communication system; and the necessary switchboards and controls.

All deck and engine room auxiliaries will be electric drive except the feed pumps which will be steam turbine drive. As will be noted in the profile drawing herewith, the turbines and boilers are compactly arranged in one compartment amidship.

The loaded displacement weight is composed of:

Weight of structure Machinery, equipment, stores and outfit	5689 tons
Fuel Oil in tanks	1500 tons
Fresh Water	510 tons
Passengers, Crew and Baggage	90 tons
Cargo	8936 tons
Total	16725 tons



Inboard profile of C-3 type U. S. Maritime Commission cargo vessel, two of which are to be built at the yard of the Moore Dry Dock Co., Oakland, California.

HULL AND ENGINE REPAIRS

FULLY EQUIPPED FOR *Diesel Engine Work*

DRYDOCK — 12,000 TONS CAPACITY

LOS ANGELES SHIPBUILDING & DRYDOCK CORPORATION

SAN PEDRO, CALIFORNIA - - *Cable*: LASHIPCO

Bethlehem Gets Three Delta Line Ships

U. S. Maritime Commission on December 16 approved the bid of the Shipbuilding Division of Bethlehem Steel Company Inc. for the construction of three combination cargo and passenger steamers for the Mississippi Shipping Company Inc. (Delta Line) at a total cost of $9,654,000. They are to be built at Bethlehem's Sparrows Point yard.

The design for these vessels was prepared by V. M. Friede of New Orleans, consulting naval architect for the Mississippi Shipping Company. The design is fully described in Pacific Marine Review for October. It calls for a ship having these characteristics:

Length O. A.	492′
Beam	65′ 6″
Load draft	25′ 6″
Displacement loaded	14,200 tons
Gross measurement	8,300 tons
Deadweight cap.	8,900 tons
Passenger cap.	63
Sea service speed	16½ knots
Steam pressure	450 lbs.
Steam temperature	750° F.

Main propulsion machinery will be a set of cross compound steam turbines taking steam from 3 water tube boilers and driving the single screw shaft through double reduction gearing.

Electric power will be used for all deck machinery as well as for the majority of under deck auxiliaries and for the galley ranges. Three steam turbo-generating sets of 300 KW capacity will be installed in each ship to take care of this auxiliary load.

These are to be two-compartment class ships and will incorporate all the rigid American requirements for fire prevention, fire detection, and fire extinguishing systems.

The three ships will maintain a sailing every 21 days from New Orleans and other Gulf ports to Rio de Janeiro, Santos, Montevideo, and Buenos Aires.

Artist's conception of the steamers designed by V. M. Friede, naval architect of New Orleans, for the Mississippi Shipping Company. Three of these are to be built by the Shipbuilding Division of the Bethlehem Steel Company, Inc.

● Fore River Launches Ancon

Hull No. 1468, the second of three combination cargo and passenger vessels for the Panama Railroad Steamship Line, was christened Ancon and launched at the Fore River Yard of the shipbuilding division of the Bethlethem Steel Company, Inc., on December 10. Sponsor of this vessel was Mrs. Harry H. Woodring, wife of the U. S. Secretary of War.

● Newport News Double Launching

The torpedo boat destroyers Mustin and Russell, under construction at Newport News Shipbuilding and Dry Dock Co., were both launched December 8 with double christening ceremonies. Keels for these vessels were laid December 20, 1937, and they are billed for completion in June, 1939. Of the 1500-ton class, they were contracted at $4,125,000 each.

● Sparrows Point Launches Union Tanker

Sparrows Point Plant of the Shipbuilding Division of Bethlehem Steel Company Inc. on December 10 launched the 13,000-ton tanker L. P. St. Clair for the Union Oil Company of California.

She was named in honor of the chairman of the board of directors of the Union Oil Company and christened by Mrs. St. Clair.

Built on the Bethlehem-Frear system of fluted bulkhead construction, this tanker has capacity for 103,000 bbls. of cargo oil, and will be powered with Bethlehem cross compound turbines of 3,500 shaft horsepower connected through double reduction gearing to a single screw shaft and driving the hull at 13 knots loaded sea speed.

Union Oil officials at launching included: Mr. and Mrs. L. P. St. Clair, President Reese Taylor, Vice-President W. L. Stewart, Jr., Director of Transportation William Groundwater, and Superintending Engineer A. O. Pegg.

The L. P. St. Clair is expected to arrive at Los Angeles harbor about April 1 on her maiden voyage.

● Calls for Bids on Puget Sound Tanker

Carl Nordstrom, naval architect of Seattle, invited bids from shipbuilders on an all steel bulk oil carrier to be used in Puget Sound service for an undisclosed owner.

This vessel is to be 140 feet long, 27.6 feet beam, and 13.6 feet depth, with 900 tons displacement and a capacity for 500 tons of oil cargo. She is to be powered with diesel engines for a specified speed of 9 knots. Bids were to be opened December 28.

● Contract for Five Fish Scows

On December 3 Maritime Shipyards Inc. of Seattle was awarded by the Thomson Salmon Company of Astoria, Oregon, a contract to build five fish scows.

These scows will be 72 feet by 24 feet. Three will be fitted with twin screws driven by diesel engines of sufficient power to give them 7 knots speed when fully loaded. The other two craft are to be without power. The power scows will each have accommodations for a crew of five men.

This flotilla is for fishing operations at Bristol Bay, Alaska, where the Thomson Salmon Company are building a cannery.

● U. S. Liner to be Named America

The express passenger steamer now building at the Newport News Shipbuilding and Dry Dock Company yard for the North Atlantic passenger ferry service of the United States Lines as a running mate for the Washington and the Manhattan will be the largest commercial vessel built in an American shipyard. As such, she has a very popular appeal and hundreds of suggestions for naming her have been received by her owners. However, it has now been officially announced by John M. Franklin, president of the United States Lines, with the approval of the Maritime Commission, that she will be christened America.

● Sun Gets Four C-3 Motorships

On the 29th of November the Maritime Commission accepted the bid of Sun Shipbuilding and Dry Dock Company, Chester, Pa., for the construction of four diesel propelled single screw cargo vessels of the C-3 class design. The bid figure was $2,729,800 for each ship.

● Moore Lays Keel for L. H. Tender

The keel of the first of two lighthouse tenders was laid at the yard of the Moore Dry Dock Co., Oakland, California, on December 10. These vessels are to be of steel, 174' 10½" long, 32' beam, and 14'6" depth, twin screw and triple expansion steam engines. They are to be completed in 300 calendar days.

New Motor Ship Peru Added to Johnson Fleet

Officials of W. R. Grace and Co., Pacific Coast General Agents for the Johnson Line, arranged a press luncheon on December 16 aboard the new motorship Peru at San Francisco. This fast and luxuriously appointed liner is one of nine modern passenger and freight carriers engaged in the various services of the Johnson Line. The hospitality extended the newspaper and publishing representatives as the Peru was berthed at Grace pier 37 made the occasion one of the most pleasant in West Coast publicity relations.

Hosts were: Capt. Karl Andreasson, marine superintendent of the Johnson Line on the Pacific Coast; Fred Doelker, Pacific Coast manager for the Grace Line; Guy E. Buck, assistant Pacific Coast manager; Robert E. Pyke, general freight agent; and E. J. Judge, passenger agent. An appropriate address was delivered by Curt Leijon, of the Swedish consulate. Guy Buck recounted the history of business relations between the Grace organization and the Johnson Line.

The Peru has superb accommodations embodying every modern travel comfort facility for 12 first class passengers. A feature of her design is the modern and spacious express refrigeration cargo facilities. The Johnson Line ships of the Peru type make the run from San Francisco to London, first port of call, in 24 days. Capt. A. F. Ranke is master.

In the Johnson Line fleet of the Peru class are the motor vessels Argentina, Brazil, Nordstjernan, Uruguay, Colombia, Chile, Peru, Venezuela, and Hull No. 9, now building in Sweden.

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Strength Permanence Stability

A Midget Radio Telephone

For the safety and convenience of those thousands of yachtsmen who put out to sea in small boats, the Western Electric Company is introducing a low priced, midget marine radio telephone so simple to operate, so reliable and small, that it may be compared with the familar telephone ashore.

The little instrument is designed to link those aboard the craft with the telephone system on land, with the Coast Guard, and with other radio equipped boats.

To make a call with the new instrument the user merely turns an "on" switch which places the equipment in operation, presses a "talk" button contained in the handle of the handset, and gives the telephone operator the number desired. Calls coming from shore, or from other boats, are signaled by a loudspeaker contained within the instrument. The loudspeaker may be switched off during the subsequent conversation.

Provision may be made also for "selective calling." A boat so equipped is assigned a number, and its equipment maintains a continuous, silent watch, to receive only calls that may be directed to it. When the shore station operator dials its number, a telephone bell rings exactly as on land.

Built in a single, self-contained unit, and designed to occupy less space than a small overnight bag, the instrument is easy to install. Radio transmitter, receiver, power conversion pack, and built-in loudspeaker are all assembled in a special metal cabinet that is finished to resist corrosion, and only three electrical connections are required for installation: the antenna wire, ground, and power supply.

The device may be operated from a six or twelve volt battery or it may be simply adjusted for use with other voltages. The transmitter operates on any one of four crystal controlled frequencies. By merely changing the quartz plates, frequencies other than those originally selected for the transmitter may be substituted, within the range of the equipment. No further tuning adjustment is required when making the change. The receiver, too, may be crystal controlled if desired, which eliminates the inconvenience of "fishing" for incoming calls.

No specially trained personnel is required to operate the equipment. The regulations of the Federal Communications Commission permit the operation of radio telephone equipment in marine service by persons holding a third class radio telephone operator's license, which calls only for an elementary knowledge of the radio laws and regulations and familiarity with the method of operating the equipment. No knowledge of the radio telegraph code is necessary. The license, of course, is required only for the technical operation of the equipment and does not apply to passengers, guests and others who may have occasion to use it for telephoning.

Vortex Syncro-Silencer For Diesel Engines

Engineering Specialties, Inc., announces the Vortex Synchro-Silencer for both marine and stationary diesel engines.

After thorough testing and operation under service conditions, this newly developed unit shows a decidedly lower decibel rating than has been previously possible for commercial mufflers of corresponding size and cost. Back pressure, also, is much less on the same basis, which is extremely important, especially for two cycle and opposed piston type engines.

Just as the Vortex Spark Arrester was the first of its type in America, the Vortex Syncro-Silencer

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also introduces, for the first time in this country, new design and construction features which are vital to proper exhaust muffling.

This silencer is individually designed for each specific engine on the basis of power, speed, bore and stroke. It is mathematically tuned or synchronized to attenuate the fundamental engine frequencies as well as the harmonics and sub-harmonics of the particular exhaust system as a whole. Although effecting a degree of muffling heretofore commercially unknown, there are no restrictions of gas flow or other difficulties which have reduced engine efficiency in the past.

Another important feature is the logical separation of spark arresting from silencing. The Vortex Spark Arrester and the Vortex Syncro-Silencer can be used equally well separately or together, depending upon the engine owner's individual problems of fire hazard and noise, or both. When used together it is no longer necessary that both be installed as a unit. For instance, the spark arrester can be placed close to the exhaust manifold and the silencer literally anywhere else desired, in or out of the same line or plane and at any reasonable distance. It may be said that this wide flexibility of modulation has brought muffler design abreast of advanced engine design to solve a wide variety of application problems.

Experiments show that after each explosion exhaust gas leaves an engine cylinder ballistically as a resilient mass. It has also been demonstrated that sound waves precede such a theoretical "projectile" with different frequencies according to the individual operating characteristics of each engine. Further complications often arise from coincidence of an engine frequency harmonic with the resonance frequency of the exhaust manifold and piping as well as combinations of sub-harmonic frequencies of the exhaust system as a whole. Obviously, therefore, unless all of these noise-propagating conditions are satisfied, most efficient silencing cannot be attained.

The new Vortex Syncro-Silencer is specifically designed to synchronize correct silencing properties with each exhaust noise condition from the initial explosion in the combustion chamber to atmospheric discharge from the tail-pipe. In external physical appearance and size it is similar to previous commercial types. Internal construction from the standpoint of ruggedness and durability as well as silencing is commercially satisfactory since its high efficiency depends upon accurate engineering rather than complicated design. Actually there is a "stepping down" process that can be likened to replacing a sharply vertical waterfall with a series of gentle slopes. The same volume of water falls the same vertical distance in the same direction but without the roar and impact of one sheer, uncontrolled drop. Similarly, the exhaust gas impulses and sound waves are stepped down to discharge quietly without appreciable back-pressure, change of direction or power-consuming obstructions.

To date, all commercial installations of the Syncro-Silencer have exceeded diesel owners' expectations based on previous silencing experience. This has been particularly true of difficult cases involving two-cycle engines in populous locations which are the ultimate tests for such a unit. It is now available for diesel engines of all types and sizes from 75 horsepower up.

Correction

On page 68 of our November issue it was stated that Capt. Sullivan was for many years assistant inspector in the San Pedro offices of the Bureau of Marine Inspection and Navigation of the Department of Commerce, and that **Capt. William Fisher** was Supervising Inspector of the First District. Capt. Sullivan had been assistant inspector in the San Francisco office for many years, and Capt. Fisher is Supervising Inspector of the Seventh District. In 1936 the Supervising Inspection Districts of the Bureau were reduced from eleven to seven by combining several districts, and the boundaries of many of the districts were changed. The former First and Eleventh Districts, which comprised all of the Pacific Coast, were united to form what is now called the Seventh District.

Observations From The Crow's Nest

"NAMES AND NEWS" ★ BY BERNARD De ROCHIE

Russ Miller, left, and Jim Castle strutting down 2nd Avenue in Seattle. Miller is Northwestern Representative of Lunkenheimer Co., successor to Jos. M. Barrett. Jim Castle is Pacific Coast Manager for Lunkenheimer. Miller was Chief Engineer in Round-the-World Service and prior to joining Lunkenheimer Co., was Chief Steam Engineer for Portland General Electric Company.

E. E. Johnson to USMC post

Ernest E. Johnson, who needs no introduction to Pacific Marine Review readers, has been appointed to the post of Orient Manager for the U. S. Maritime Commission.

Mr. Johnson's analytical articles on merchant marine subjects have long been features of this magazine's editorial pages. As anyone who has followed the series will agree, these manuscripts have especially indicated the author's knowledge of trade and operating conditions in the Oriental routes.

Mr. Johnson will assume his new duties early in the year at Hongkong, after conferring with his chiefs at Washington.

The new manager of this important maritime district brings to his job a rare background of Pacific coastwise and offshore ship operating experience.

New Shell Dock at San Diego

Construction of the Shell Oil Company's new dock and marine station at San Diego has been completed at a cost of approximately $20,000.

The total length of the dock is three hundred feet, consisting of a sixteen foot approach at the foot of Crosby Street stretching over Bay waters for two hundred feet and widening into a wharf twenty-four feet wide by one hundred feet long.

The size of dock and wharf permits a truck to drive over it, allowing enough room to maneuver and turn around. Construction is of timber, over 125 treated piles being used to support a solid deck of three inch pine. A dockhouse 10 feet by 14 feet has been placed at the end for us as an office and for storing oils and greases.

A novel feature of the dock is the absence of all fuel and water lines on the deck. All facilities are run immediately under the deck, thus allowing an unobstructed surface for the entire length and breadth of the structure. Five lines of different sizes carry gasoline, dieseline, water and aviation gasoline direct to and from the oil concern's main plant in San Diego, 1,600 feet distant. Petroleum products are pumped into the bulk plant from sea barges for use in the San Diego area, as also from the dock itself.

Depth of water, at mean low, is seventeen feet, thus insuring twenty-four-hour service for even the larger craft using offshore waters. A twelve by twenty foot float has been provided for servicing the smaller type of craft, the float being equipped with pipe lines. All lines on the dock are run into modern metering equipment, and the pumps, necessary to handle the fuel, are all operated by remote control.

To celebrate the opening of the dock some 150 visitors inspected the new facilities recently.

Said **C. S. Garvin**, local manager for the Shell Company, "We are very glad to have this new dock in San Diego. It will enable us to adequately handle increasing business for many years to come."

Left to right: Frank Prior, Rinaldo Passarino, Fritz Kocher, Fred Steffgen, the man who built the new dock, C. A. Davidson, Shell Oil Manager, C. S. Garvin, Tony Monise (with cigarette), H. R. P.

Propeller Club of California

News of the Month

The annual Christmas Hi-Jinks were enjoyed by Propellers and their friends on Friday, December 16, at John's Original Rendezvous in San Francisco. The famed epicureans' headquarters proved a delightful setting for the event. The merrymakers checked in at high noon and there was something adoing from the moment they crossed the plank . . . thanks to **Fletcher Monson's** fine committee.

Master of ceremonies Dick Glissman introduced several club-talent numbers to aid and abet John's own floor show, including his own inimitable Cat Song. Jack Dorward, Tom Short, Cy Meek, Tommy Graham and Eddie MacFarlan were among those at the "mike."

An impressive moment was the presentation to retiring president **C. M. Le Count** of a swell-looking fishing outfit. **Herman D. Nichols** paid tribute to "Dad" Le Count's fine leadership of 1938. It has been truly a glorious administration, with several notable achievements in the records of accomplishment. The handsome gift bears this inscription:

Presented to our Skipper
C. M. Le Count
President 1938
Propeller Club of California.

New Propellers

New members, as reported by secretary Stanley E. Allen, include:

Frank Leahy, traveling inspector of U. S. Bureau of Marine Inspection and Navigation.

Al Tarte, purchasing agent of the River Lines.

Charles Perkes, general agent of the Madrigal Line.

Luncheon Program

"Java," a full-color movie, was projected before a capacity attendance at the December 6 luncheon meeting of the Propeller Club of California. The film proved exceptional in photographic quality, and it's a great little country over there! Accompanying remarks were cleverly presented by Frank C. Kugelberg, secretary of Williams, Dimond & Co., the shipping firm.

Nominees

The nominating committee has submitted its recommendations for officers, to be chosen at the January 10 annual meeting, as follows:

For president: **C. E. Finney.**

For vice-president: **Herman D. Nichols.**

For governors (3-year term): **Winslow D. Conn., Arthur Donnelly, Richard H. Glissman, Eugene V. Winter.**

Members of the nominating committee were: **Walter J. Walsh**, chairman; **Les Moody, H. H. Brann, Chas. H. Robertson, Capt. A. T. Hunter.**

President C. M. "Dad" LeCount concludes resultful 1938 administration which was highlighted by notable progress of Propeller Club.

Pacific Marine Review is very proud of the following letter from president **C. M. Le Count:**

"The Pacific Marine Review has always given very fine support to the Propeller Club of California, but the November issue is a wonder. I fully appreciate the amount of time and expense your company has given to further the interests of our club, and on behalf of the Propeller Club, I want to express our appreciation.

"Will you also please thank Mr. Paul Faulkner for the very fine work he has been doing with the newspapers. We have certainly received a lot of very fine publicity due to his efforts. The cooperation that I personally have received from your company will always be remembered.

Yours very truly,
C. M. Le Count
President"

Treasure Island Exhibit

Within a short time now, the gates of beautiful Treasure Island on San Francisco Bay will be open to the expected fifteen million persons who will visit this great exhibit of the West.

One of the largest and most spectacular of all the buildings is the Palace of Mines, Metals and Machinery, in which will be located the exhibit of the Tubbs Cordage Company, makers of Tubbs rope and twine.

Here, in over sixty feet of aisle space, the Tubbs Cordage Company will exhibit actual rope making machinery in operation. Beautifully colored slides will be shown continuously, depicting the story of the making of rope and its use in industry.

In the same building will be housed such other sensational exhibits as Treasure Mountain, a complete replica of the California mine diggings, and the United States Steel exhibit, depicting the city of 1999, streamlined entirely of steel. It is expected that millions of visitors will see these exhibits and learn in a graphic way, when they visit the Tubbs display, the processes in the making of rope.

News of "The Bilge Club"

By William A. Mason

Lieut. Commander, U. S. Navy

(Retired)

The harbor shipping fraternity, the Bilge Club, held an informal dinner "cruise" on Friday, December 9, at its new headquarters in the California Yacht Club at Wilmington. Over 200 members turned out to make this meeting a most pleasant get-together. No set program was presented, but the dinner was enlivened by ballad singing led by Jim Bunting.

Several of the leading legal lights of the club presented an informal skit immediately after the dinner. Sociability and informality was the keyword, and the members played cribbage and dominoes while an entertainer with the accordion led those who were vocally inclined in songs and sea chanteys.

A thousand guests

On Tuesday, November 29, the Bilge Club played host to approximately one thousand marine men, who gathered in the high school auditorium at San Pedro for a program of music and scientific motion pictures, presented through the courtesy of Capt. G. Allan Hancock. There was an hour of music by the Allan Hancock ensemble, followed by a motion picture taken on recent scientific expeditions of Capt. Hancock's cruiser, Velero III. This latter showed land and sea life of southern Pacific Coast regions.

Ambrose Russo, first violinist with the ensemble, also appeared in two solos, and was enthusiastically received by the audience. Capt. Hancock is 'cellist with the ensemble, which is composed of piano, harp, flute, gass, viola, two violins and 'cello.

The motion pictures depicted a voyage to tropical seas, showing life aboard the specially - equipped cruiser, and intimate studies of birds, mammals and reptiles.

Harms, Myers, Robertson visit us

Among the prominent visitors at the Bilge Club on Friday, December 2, were Ralph Myers, president of the Shipowners Association of the Pacific Coast, and Edward Harms, assistant operation manager of McCormick S. S. Co. They were introduced by Bud Richley, Wilmington representative of McCormick.

Charles J. Robertson, assistant marine superintendent of the Standard Oil Company, Marine Division, San Francisco, was a luncheon visitor at the club on December 13.

K. M. WALKER RETURNS TO COAST

Kenneth M. Walker, well known to Coast shipping men from his long business activity in Seattle, has recently returned from several years in Chicago to the shores of his native ocean. He has established offices as a marine surveyor at 260 California Street, San Francisco.

Mr. Walker is the son of the esteemed Frank Walker, late marine surveyor and consulting engineer of Seattle. Mr. Walker Sr. enjoyed a prominent career in the shipping and shipbuilding activities of the Puget Sound district for a number of years.

K. M. Walker answered the call of the sea at the age of 12, sailing in both sail and steam vessels. He had a decided flair for navigation, and at the early age of 16 decided on marine engineering as a career, entering a four-year apprenticeship with the famous Moran shipyard on the Sound. He attended night school and received private tutelage during this four-year period, working meanwhile in all departments in the shipyard, including the drawing office. Products of the Moran yard at that time were whalers Patterson, Moran, Star 1, 2 and 3; the freighter La Touche, the Government dredge Col. P. D. Michie, several submarines, and the familiar passenger vessels of the Sound's "mosquito fleet," Sioux, Sol Duc, Kulshan, and Tacoma.

Kenneth M. Walker

At the age of 20 young Walker returned to sea, shipping on the four mast bark William P. Frye. He returned to San Francisco from war experiences aboard German raiders on the freighter G. L. Luckenbach, entering the employ of the Union Iron Works, where he worked on the design of many freighters, oil tankers and passenger vessels, including the Matson liner Maui.

Mr. Walker later engaged as business partner of his father in Seattle as a marine surveyor, handling owners' surveys for Pacific Steamship Company, Alaska Steamship Company, Puget Sound Navigation Company, and other lines. His office converted the steamer Congress into the Chinese passenger steamer Nanking after the disastrous fire off Columbia River in '17. During the years of America's entry into the World War, he superintended the construction of over 100 ships, mostly French and Belgian vessels, and built the Foundation Shipyard in Seattle, Tacoma and Victoria.

In 1922 he established himself as a marine surveyor in Chicago, specializing on marine underwriters' work. After 16 years in the Great Lakes district he has come back to the Coast, where he is now renewing friendships with many of his former associates. Mr. Walker has been a member of the Society of NAME since 1922. He was appointed surveyor to Lloyd's Register of Shipping in Chicago in 1930.

Names & News

CAPT. JACOB M. STAMPERIUS

After nine years of sailing the Pacific Coast-European run on Holland-America Line motorships, Capt. Jacob M. Stamperius has been given the bridge on the company's new motorship Zaandam. The vessel is scheduled to sail from Rotterdam on January 7 on her maiden voyage to New York.

The Delftdyk was Capt. Stamperius' most recent command. He was born on The Netherlands' island of Tholen. In 1903 he went with Holland-America as an apprentice on the second Rotterdam.

JOHN CORMODE

Resigning as vice president of the American Mail Line, John Cormode has rounded out twenty-four years of service with the company and its predecessor. He served as vice president for the past three years.

LT. COMM. C. W. THOMAS

On December 16 Lt. Comm. C. W. Thomas, commander of the Coast Guard patrol group at San Pedro since 1934, was succeeded by **Lt. Comm. N. S. Haugen**, the latter being the new captain of the patrol boat Aurora. Lt. Comm. Thomas was transferred to shore duty at Boston on the staff of the North Atlantic division commander. During the past four years he built up the San Pedro group into a splendidly coordinated force. **Lt. E. G. Brooks** took over command of the patrol boat Hermes, former command of Lt. Comm. Thomas.

D. W. FORD

Matson Line, through **C. S. Booth,** assistant general freight agent for Southern California, announced the promotion of D. W. Ford to assistant claim agent in charge of that department. Mr. Ford is headquartered in the Roosevelt Building, Los Angeles. He has been in transportation work for over 15 years, the last 10 having been with Lassco-Matson organizations as freight clerk on the Yale and Harvard, check clerk, freight cashier, and claim investigator in the Los Angeles office.

CAPT. WILLIAM H. BATCHELDER

After holding the distinction of being the oldest Dollar Line master, Capt. William H. Batchelder passed away on November 26 at the Marine Hospital, in San Francisco. He was a native of Maine, going to sea as a boy of 14. His association with the late Capt. Robert Dollar lasted for over thirty years, his last commands being the Robert Dollar and Stanley Dollar.

AMERICAN PRESIDENT LINES PROMOTIONS

Following a recent board of directors meeting of the American President Lines, president **Joseph R. Sheehan** announced that **Thomas E. Cuffe,** freight traffic manager, and **P. H. Bordwell,** assistant general manager in the Orient, with headquarters at Shanghai, had been elevated to the rank of assistant vice presidents.

They are assistants, respectively, to **M. J. Buckley,** vice president in charge of freight traffic, and **Oscar G. Steen,** vice president in charge of American President Lines' activities in the Orient. Both are well known in transportation circles on each side of the Pacific.

Mr. Cuffe is still a young man, despite the fact that he is already a veteran in the shipping business. Born in Stockdale, Kan., he joined the old Dollar Line in San Francisco in 1921. Starting as a primer clerk, he worked up through all departments in freight traffic and knows the business thoroughly.

Mr. Bordwell is a native of Alameda. He, too, is an "old timer" in transportation, having joined the old Dollar Company twenty-eight years ago. All but five of those years he has spent in the Orient. Next to Oscar Steen, his chief, he knows the Orient as few other Americans. He will continue to make his headquarters in Shanghai, which, incidentally, is being restored as a port of call for the line's ships.

FRANK P. FOISIE

Formerly manager of the Waterfront Employers of Seattle, Frank P. Foisie was elected on December 12 as president of the Waterfront Employers' Association of the Pacific Coast. He succeeds **Almon E. Roth,** who resigned to become president of the San Francisco Employers' Council.

Mr. Foisie became associated with Seattle shipowners in 1920 as a Coast coordinator for employers of waterfront labor, traveling extensively between Pacific Coast ports.

Mr. Roth's post as president of the Pacific American Shipowners' Association has been filled by **J. B. Bryan,** long with the Waterfront Employers' Association.

DWIGHT HILL

Sometime during the early part of January Dwight Hill, Northwest traffic manager for Burchard & Fisken, Inc., will leave Seattle for Hongkong to become manager of the Moller Line. He has been engaged in Seattle and Portland shipping since 1923. The Moller Line operates thirty-two steamships, nine salvage tugs and river tugs and barges, under the British flag.

THOMAS J. OWEN

Chas. A. Perkes, general manager on this Coast for C. F. Sharp & Co., Ltd., of Manila, managing operators of the Madrigal Line, has announced the appointment of Thomas J. Owen as operating superintendent in San Francisco for the company.

Mr. Owen was for many years assistant to the operating manager of the Pacific Steamship Lines and has a thorough and intimate knowledge of general steamship operations up and down the entire Pacific Coast. He has recently been employed by the United States Maritime Commission.

Three Holland-America Line chief engineers, each of them just having completed forty years at sea in the company's ships, had a reunion meeting in Rotterdam early in December, one of the rare occasions on which coincidence brought them in port together since their student days.

They are **Abraham Beker** of the Rotterdam, **William Niessink** of the Volendam, and **Arij van Son** of the Statendam.

Flash! New Shipbuilding and New Contracts In Pacific Coast Shipyards

Total price, $5,715,520.00

(1) Moore Dry Dock Co., Oakland, California, awarded contract by the U. S. Maritime Commission for two C-3 type 16½ knot cargo carriers.

Total price, $779,493.00

(2) Moore Dry Dock Co., Oakland, California, laid keel for first of two lighthouse tenders for U. S. Lighthouse Bureau.

Total price, $892,000.00

(3) Lake Washington Shipyards will lay keel January 15 for steel survey ship Explorer for U. S. Coast and Geodetic Survey.

Total price, $283,000.00

(4) Albina Marine Iron Works, Portland, are busy on conversion of freighter Pacific Spruce to a cannery service ship.

Total price, $389,650.00

(5) Winslow Marine Railway and Shipbuilding Co., Winslow, Washington, awarded a contract for construction of floating caisson gate for new graving dock at U. S. Navy Yard, Bremerton.

Total price, $250,000.00

(6) The Maritime Shipyards, Inc., of Seattle have contracts for 13 fishing craft aggregating a total price of over $250,000.00.

Total price, $104,300.00

(7) Astoria Marine Construction Co., Astoria, Oregon, is busy on the following: an 88-foot wooden survey vessel to be named E. Lester Jones, building for U. S. Coast & Geodetic Survey.

Total price, $80,000.00

And one yacht, two barges, and a cannery tender. Approximate total price, $80,000.00.

Total cost, $145,000.00

(8) San Diego Marine Construction Co., San Diego, Calif., is completing for January delivery the reseach boat N. B. Scofield for the California Fish and Game Commission.

Grand total work now in Pacific Coast shipyards, $8,636,963.00

It is reported that:

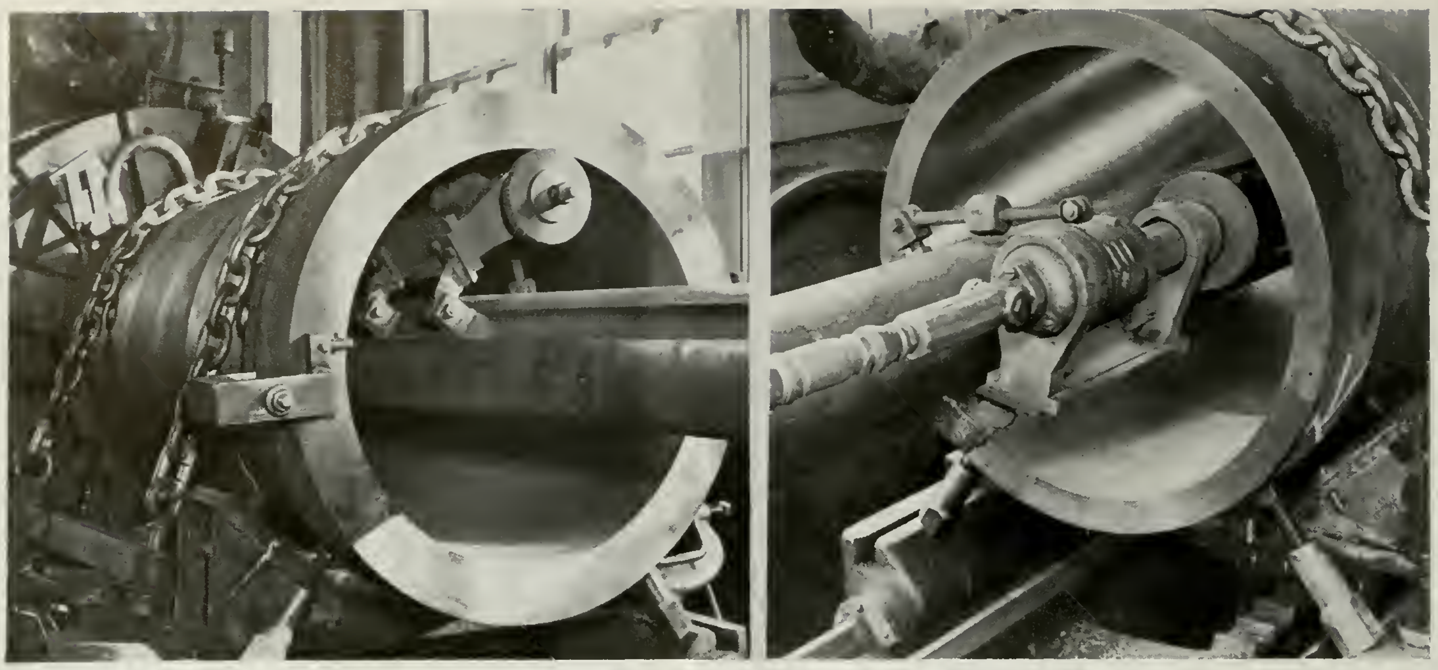
(1) Seattle First National Bank, owners of Wallace Bridge and Structural Steel Co. (formerly Duthie Shipyard) and the Seattle Chamber of Commerce have launched a plan to raise $750,000.00 in cash for financing the conversion of this plant to a shipyard and to secure contracts from the U. S. Maritime Commission. Up to December 15th over $200,000.00 had been subscribed by Seattle business men.

(2) Tacoma business men are working on a plan to revive the old Todd yard there as a hull building plant. Hulls to be towed to Todd Dry Docks at Seattle for outfitting. During week of December 19th a group of Todd officials from the Seattle plant made a survey of costs at Tacoma and reported favorably to headquarters at New York.

(3) San Diego business interests are busy with plans for financing a shipyard and for securing contracts to build under the U. S. Maritime Commission replacement program.

(4) Los Angeles public bodies are united in bringing pressure for awarding of contracts to the Los Angeles Shipbuilding & Dry Dock Co. and undoubtedly that yard will be in active competition as soon as its legal entanglements are ironed out.

All in all, Pacific Coast shipbuilding is entering 1939 with a larger volume of work in hand and better prospects for new contracts than at any time during the past 15 years.



An Interesting Set-Up For Grinding Cylinder Liners

Our illustrations show an interesting special set-up on one of the big lathes at the General Engineering & Dry Dock Co.'s San Francisco shops for grinding the bores of a new set of cylinder liners for the diesel engines of the U. S. Engineer's dredge A. Mackenzie.

A portable compressed air drive grinder is mounted on the boring bar and the liner is mounted on the lathe carriage both in the manner plainly shown in the illustrations. Air for the pneumatic motor that drives the grinding wheel is fed through a hose which is carried in clamps on the boring bar and led into the lathe through the hollow spindle of the headstock.

A perfect surface of mirrorlike smoothness is produced by this process.

This is another example of the equipment and the expert adaptation thereof that is always available at General Engineering & Dry Dock Co. to meet any marine need.

150 Ampere A. C. Arc Welder

Victor Equipment Company announce that they have received the new General Electric alternating current arc welding machine type WK-150 ampere capacity. The A.C. type of arc welder has become quite popular in the smaller capacities. To adequately meet the rigid requirements of the latest Reexamination Service of the National Board of Fire Underwriters, as well as the need for a dependable and smaller capacity A.C. type arc welding machine, General Electric Company offer a machine of outstanding merit.

The model WK-150 ampere is said to possess the most ideal welding characteristics, with low operating cost and high efficiency.

Woven spun-glass offers a most perfect insulation and prevents injury from heat on heavy overloads. Solidly brazed interior connections prevent open circuits—the machine is designed and built to give years of safe and satisfactory service.

Continuous, stepless current control provides for fine current adjustments from 30 to 180 amperes. It will serve every welding need for electrode sizes from 1/16″ to over ⅛″. A large, easily readable scale clearly indicates the welding current setting, and adjustment can be made any time without interrupting the arc or opening any electrical connections. The welding load is easily and safely connectible and a circular cover plate over terminals prevents chance contacts. The machine weighs approximately 205 lbs., is 30″ high and 16″ in diameter. Sturdily constructed roller casters permit the machine to be moved readily.

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A. S. Kirkeby, Managing Director

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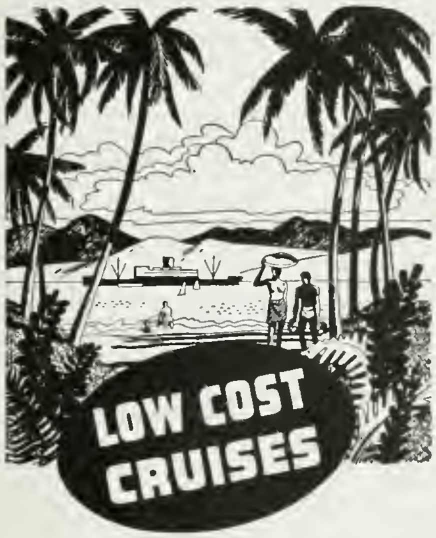

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Foot of Fifth Avenue
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HARBOR BOAT BUILDING CO.
Berth 264, Fish Harbor
Terminal Island, Calif.

DRYDOCK AND ROUTINE REPAIRS: Destiny, Northwestern, White Star, Santa Marguerita.

HONOLULU IRON WORKS
Honolulu, T. H.

DRYDOCK AND ROUTINE REPAIRS: M.S. Sawokla, President Adams, U.S.C.G. Reliance.

LAKE WASHINGTON SHIPYARDS
Houghton, Wash.

NEW CONSTRUCTION: 200 foot steam geared turbine steel survey ship Explorer for U. S. Coast & Geodetic Survey.

LOS ANGELES SHIPBUILDING & DRY DOCK CORP.
Los Angeles Harbor
San Pedro, Calif.

DRYDOCK AND ROUTINE REPAIRS: Lehec, M.V. Romancia, El Capitan, Tug Milton S. Patrick, G. P. Barge No. 3.

MARE ISLAND NAVY YARD
Mare Island, Calif.

NEW CONSTRUCTION:

Swordfish, Submarine (SS193); keel laid October 27, 1937; estimated delivery date August 1, 1939.

Two harbor tugs, YT 133 and YT 134; keels laid September 29, 1938.

Garbage Lighter (YG 21); keel laid July 25, 1938.

Order received for construction of one submarine tender, Fulton (AS 11); dated June 30, 1938.

Order received for construction of one submarine, Tuna (SS203); dated June 30, 1938.

THE MOORE DRY DOCK CO.
Oakland, Calif.

NEW CONSTRUCTION:

Hulls Nos. 193 and 194, two lighthouse tenders for Bureau of Lighthouses; LOA 174′ 10½″, beam molded 32′, depth 14′ 6″. Twin screw triple expansion engines; water tube boiler; 1000 horsepower. One for Pacific Coast; one for Great Lakes. Keel for first ship laid December 5, 1938.

Hulls Nos. 195-196, two C-3 type cargo vessels for U. S. Maritime Commission.

DRYDOCK AND ROUTINE REPAIRS: Alamo, City of Bremer, Virginian, United, El Commodore, North Star, Invader, Sea Pirate, Midnight Sun, Norby, President Cleveland, Svenor, Oceania, Western Pilot, New Roma, Genevieve H-2, California Star, New Saturnia, El Capitan, Aletta-B, Komoku, Los Angeles, Sea Maid, Invader, Geneva, John-R, Mexican, Minnesotan, Shawnee, Lewis Luckenbach, Vancouver, Infallible, Silverbeech, J. B. Edwards, Coloradan, Golden Gate, Santa Fe Barge No. 8, Weser, Silverpalm, Bengalen, Dauntless, W. S. Miller, Oakland, Carolinan, Claremont, Sobre Los Olas, Honolulan, Texan, Santa Fe Barge No. 7, Maltha, District of Columbia, Excellent, Esther Johnson, Hawaiian, Alabaman.

THE PUGET SOUND NAVY YARD
Bremerton, Washington

NEW CONSTRUCTION:

U.S.S. Wilson (Destroyer No. 408); standard displacement, 1500 tons; keel laid March 22, 1937.

U.S.S. Charles F. Hughes (Destroyer No. 428); standard displacement 1600 tons; order placed by Navy Department December 7, 1937.

Ships authorized, work not started: Woban (YT138), harbor tug; Ala, (YT139), harbor tug; Barnegat (AVP10), seaplane tender; Biscayne (AVP11), seaplane tender; Monssen (DD436), destroyer.

DRYDOCK AND ROUTINE REPAIRS: Pennsylvania, Tennessee, Boholink, Wright, Oklahoma.

TODD SEATTLE DRY DOCKS, INC.
Harbor Island
Seattle, Wash.

DRYDOCK AND ROUTINE REPAIRS: M.S. Ballard, Katrina Luckenbach, West Cactus, K. I. Luckenbach, Winslow, North Wind.

WESTERN BOAT BUILDING CO., INC.
2505 East 11th Street
Tacoma, Wash.

NEW CONSTRUCTION:

Hull No. 131, purse seine fishing boat, 78′x20′x9′; 200 H.P. Atlas engine; launching date May 1, 1938.

Hull No. 132, 50′ pick-up fishing boat for New England Fish Company. Keel laid March 12, 1938.

Atlantic, Lakes, Rivers

AMERICAN BRIDGE COMPANY
Pittsburgh, Pa.

NEW CONSTRUCTION:

Ten standard coal barges 175′ x 26′ x 11′, for builder's account.

Fifteen coal barges with double steel botton 195′ x 35′ x 11′, for Central Barge Co., Chicago.

BATH IRON WORKS
Bath, Maine

NEW CONSTRUCTION: Hulls Nos. 162 and 163; DD395 Davis and DD396 Jouett; two 1850-ton destroyers for U.S. Navy; date of contract September 19, 1935. Keels laid No. 162, July 28, 1936; No. 163, March 26, 1936. Launching dates, No. 162, July 30, 1938; No. 163, September 24, 1938; estimated delivery dates, November 9, 1938 and February 3, 1939.

Hulls Nos. 170-171, DD409, Sims, and

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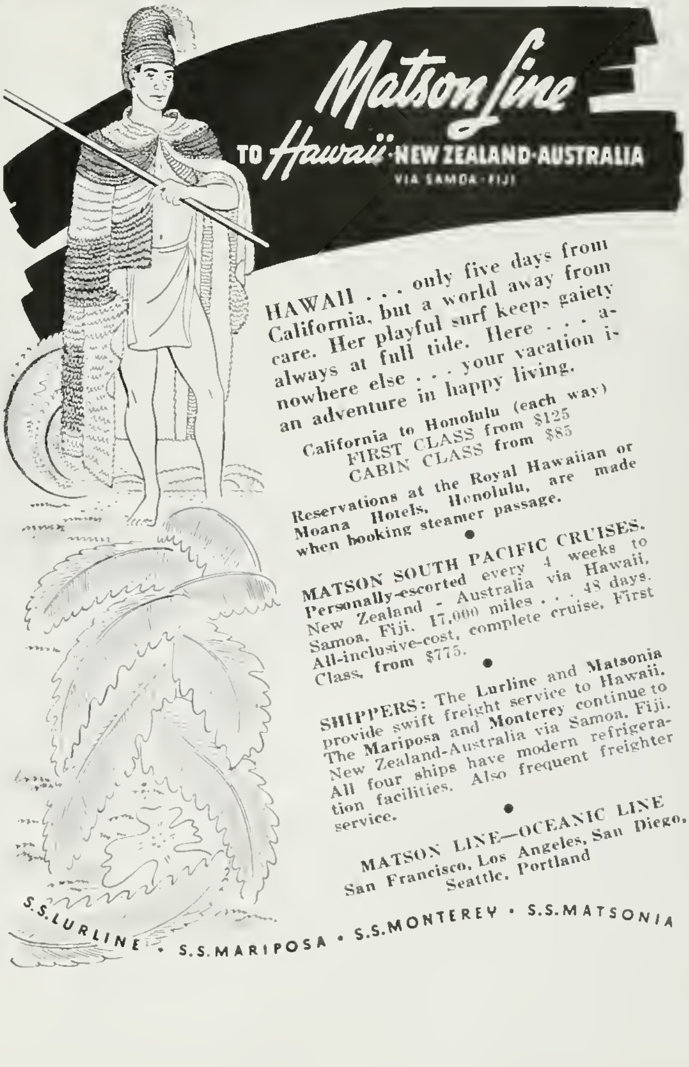
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MATSON LINE—OCEANIC LINE
San Francisco, Los Angeles, San Diego,
Seattle, Portland

DD410, Hughes, two 1500-ton destroyers for U. S. Navy; contract date October 12, 1936; keels laid July 15 and September 15, 1937, respectively; launching dates, indefinite; delivery dates April, 1939, and June, 1939, respectively.

Hulls Nos. 177 and 178, DD423 and DD424, two 1620-ton destroyers for U. S. Navy. Contract date September 30, 1937; delivery dates April and June, 1940, respectively.

Hulls Nos. 180-181, DD429 and DD430; two 1620 ton destroyers for U. S. Navy. Contract dated August 15, 1938; delivery in 28 and 30 months, respectively.

BETHLEHEM STEEL COMPANY, INC.

Shipbuilding Division
Fore River Plant,
Quincy, Mass.

NEW CONSTRUCTION:

CV7, Wasp, Airplane Carrier for U. S. Government; keel laid April 1, 1936.

Hulls Nos. 1467, 1468, 1469, three passenger and freight steamers for Panama Railroad S.S. Co.; 486 feet x 64 feet x 38 feet 6 inches; 16½ knot speed. Keels laid, Nos. 1467 and 1468, October 25, 1937; No. 1469, November 15, 1937; **launching dates** September 24, 1938, **December 10, 1938, and January, 1939.**

Hulls Nos. 1470 and 1471, two 1500-ton destroyers for U. S. Government; delivery dates March, 1940 and May, 1940.

Hulls Nos. 1472 and 1473, two diesel powered trawlers 147'0" overall, 128'9" perps., 27'0" beam, 14'4" depth; Hull No. 1472 launched October 8, 1938; **No. 1473 launched November 10, 1938; delivery dates November 18 and (estimated) December 15, 1938.**

Hulls Nos. 1474, 1475, 1476 and 1477, four freight vessels for American Export Lines, Inc.; 450' B.P. x 66' x 42'3"; 16½ knots; geared turbines and water tube boilers. Keel laid No. 1474, November 10, 1938.

BETHLEHEM STEEL COMPANY, INC.

Shipbuilding Division
Sparrows Point Plant
Sparrows Point, Md.

NEW CONSTRUCTION:

One tanker for Texas Co.; about 13,000 deadweight tons; steam turbine; launched September 1, 1938.

Hull No. 4334; one 13,000 dwt. oil tanker for Union Oil Co. of Calif. Contract signed March, 1938. **Launching date December 10, 1938.**

Hulls Nos. 4329, 4330, 4331; three 16,300 dwt. ton tankers for Standard Oil Co. of N. J.; 18 knots speed. Contract signed January 3, 1938.

Hulls Nos. 4332 and 4333; two 16,000 dwt. tankers for Socony Vacuum Oil Co. Contract signed February, 1938.

BETHLEHEM STEEL COMPANY, INC.

Shipbuilding Division
Staten Island Yard
Staten Island, N. Y.

NEW CONSTRUCTION:

Hulls Nos. 8001, 8002, and 8003, three U. S. Navy fleet tugs. No. 8001, keel laying date January 3, 1939; launching date September 15, 1939; delivery date January 25, 1940. **No. 8002, keel laying date January 17, 1939;** launching date November 15, 1939; delivery date March 25, 1940. **No. 8003, keel laying date January 31, 1939;** launching date January 15, 1940; delivery date May 25, 1940.

BOSTON NAVY YARD

Boston, Mass.

NEW CONSTRUCTION:

DD402, Mayrant, and DD403, Trippe, two light destroyers for United States Navy; LBP 334', beam 35'6" depth 19'8"; keels laid April 15, 1937; launched May 14, 1938; estimated delivery dates January, 1940, and February, 1940, respectively.

DD415, O'Brien, and DD416, Walke, two destroyers; LBP 341', beam 36', depth 19'8" keels laid May 31, 1938; launching date March, 1939; delivery dates May, 1940 and July, 1940.

DD425, Madison, and DD426, Lansdale, two destroyers; 341'0" x 36'0" x 19'8". Keel laying date December, 1938; launching date April, 1940; delivery date 1940.

DD433 and DD434, two destroyers, contract awarded July 23, 1938. Keel laying date May, 1939; launching date April, 1940. completion date, 1941.

BROOKLYN NAVY YARD

Brooklyn, N. Y.

NEW CONSTRUCTION:

CL 50, **Helena, light cruiser;** L.B.P. 600' beam 61'7¾", standard displacement 10,000; geared turbine engines; express type boilers; keel laid December 9, 1936; launched August 27, 1938; estimated delivery January 2, 1940.

BB 55, **North Carolina, battleship;** L.B.P. 714' 0", beam to outside armor 108' 0", std. displ. 35,000 tons; geared turbine engines; express type boilers. Keel laid October 27, 1937; estimated launching date May 1, 1940; contract delivery September 1, 1941; estimated delivery date October 15, 1941.

CHARLESTON, S. C., NAVY YARD

Charleston, S. C.

NEW CONSTRUCTION:

Order placed for **one harbor tug;** LOA 124' 9", length between perpendiculars 117', breadth molded 28', depth molded 16'; keel laid August 2, 1937; launched March 7, 1938.

Order placed for **one harbor tug;** LOA 110' 3", LBP 98' 0", breadth 24' 0", depth at side amidships 13' 6". No dates set.

Order placed for one **harbor tug;** 65 feet long.

DEFOE BOAT & MOTOR WORKS

Bay City, Mich.

NEW CONSTRUCTION:

Hulls Nos. 72 and 73; two diesel electric harbor cutters for Coast Guard; 110' x 26' 6"; powered by 1000 S.H.P. General Motors engines; steel construction. Delivery date April, 1939.

THE DRAVO CORPORATION

Engineering Works Division
Pittsburgh, Pa., and Wilmington, Del.

NEW CONSTRUCTION:

Hulls Nos. 1480-1489, ten welded ash removal barges 150' x 37' x 12'9", for Department of Sanitation, City of New York; 5530 gross tons.

Hulls Nos. 1490-1492, three welded steel coal barges 126' x 34' x 17', for stock; 2019 gross tons.

Hulls Nos. 1503-1504, two welded steel oil barges 195' x 35' x 9'6", for stock; 978 gross tons.

Hulls Nos. 1515-1518, four double bottom cargo barges 175' x 26' x 11', for stock; 2120 gross tons.

Hulls Nos. 1519-1528, ten welded steel coal barges 175' x 26' x 10' 8", for stock; 4720 gross tons.

Hulls Nos. 1529-1538, ten welded steel coal barges 175' x 26' x 10' 8", for stock; 4720 gross tons.

Hulls Nos. 1539-1540, two welded 3 pocket dump scows 115' x 26' x 7' 6", for stock; 240 gross tons.

Hulls Nos. 1541-1542, two welded derrick boat hulls, for stock; 630 gross tons.

ELECTRIC BOAT CORP.

Groton, Conn.

NEW CONSTRUCTION:

Hull No. 29, Sargo (SS188); standard displacement 1450 tons; keel laid May 12, 1937; launching date June 66, 1938; **delivery date January, 1939.**

Hull No. 30, Saury (SS189); standard displacement 1450 tons; keel laid June 28, 1937; launching date August 20, 1938; delivery date April, 1939.

Hull No. 31, Spearfish (SS190); standard displacement 1450 tons; keel laying date September 9, 1937; launching date October 29, 1938; delivery date June, 1939.

Hull No. 33, Seadragon (SS194); 1450 tons; keel laying date April 18, 1938; delivery date December, 1939.

Hull No. 34, Sealion (SS195); 1450 tons; keel laying date June 20, 1938; delivery date February, 1940.

Hull No. 35, Tambor (SS198); standard displacement 1475 tons; **keel laying date January 16, 1939;** delivery date January, 1941.

Hull No. 36, Tautog (SS199); standard displacement 1475 tons; keel laying date March 15, 1939; delivery date March, 1941.

Hull No. 37, Thresher (SS200); standard displacement 1475 tons; keel laying date May 15, 1939; delivery date May, 1941.

THE FEDERAL SHIPBUILDING AND DRY DOCK COMPANY

Kearny, N. J.

NEW CONSTRUCTION:

Three destroyers, DD397 Benham, DD398 Ellet and DD399 Lang, 1500 dis. tons; keels laid September 1, 1936, December 3, 1936, and April 5, 1937, respectively; launching dates April 16, June 11 and August 27, 1938, respectively.

Two destroyers, DD411 Anderson and DD412 Hammann; keels laid November 15, 1937, and January 17, 1938, respectively.

Hulls Nos. 151, 152 and 153, three tankers for Standard Oil Co. of New Jersey; keels laid, No. 151, July 1, 1938; No. 152, July 15, 1938.

Hulls Nos. 154-159, six C-2 cargo vessels

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for U. S. Maritime Commission. Keels laid, No. 154, August 25, 1938; No. 155, September 20, 1938.

Hulls Nos. 160 and 161, two torpedo boat destroyers for the United States Navy.

Hulls Nos. 162-167, six C-3 cargo vessels for U. S. Maritime Commission.

INGALLS IRON WORKS CO.
Birmingham, Ala.

NEW CONSTRUCTION:

One 15-ton derrick boat hull for U.S. E.D.; launched June 1, 1938.

Two diesel dredge tenders 63'x15'6"x6'3" for U. S. Engineer Office, Memphis, Tenn. Launching date about September 10, 1938.

Ten hopper type cargo barges 280' x 48' x 11' for Inland Waterways Corp. Launching dates June to October, 1938.

JAKOBSON & PETERSON, INC.
Brooklyn, N. Y.

NEW CONSTRUCTION:

Hull No. 276, 86-foot all welded steel tug. Launching date August 31, 1938; **delivered November 15, 1938.**

LEVINGSTON SHIPBUILDING CO.
Orange, Texas

NEW CONSTRUCTION:

One all welded passenger ferry 132' LOA, 40' 8½" beam overall, 10' depth. Equipped with two 200 H.P. Atlas diesel engines. **Delivery date December, 1938.**

MANITOWOC SHIP BUILDING CO.
Manitowoc, Wis.

NEW CONSTRUCTION: **Six hopper barges** 158' x 26' x 10', capacity 800 tons, for Marine Transit Co., Chicago, Ill.

One river towboat 100' x 25' x 8', for Marine Transit Co., Chicago, Ill.

THE MARYLAND DRYDOCK CO.
A Subsidiary of Koppers Company,
Baltimore, Maryland

NEW CONSTRUCTION:

Hull No. 194, single screw steel derrick lighter for U. S. Engineer Office, N. Y. District. LOA 115' 9⅜", LBP 110', beam overall 30' 8¾", beam molded 30', depth molded 11' 9", frame spacing throughout 21", load displacement 438 tons, mean load draft molded 9' 2½". Keel laying date October, 1938; **launching date December 29, 1938.**

THE NEW YORK SHIPBUILDING CORPORATION
Camden, N. J.

NEW CONSTRUCTION:

One destroyer tender for U. S. Navy; order placed December 27, 1937.

One seaplane tender for U. S. Navy; order placed December 27, 1937.

One destroyer tender for U. S. Navy; order placed October 14, 1938.

One seaplane tender for U. S. Navy; order placed October 14, 1938.

NEWPORT NEWS SHIPBUILDING & DRYDOCK CO.
90 Broad Street, New York

NEW CONSTRUCTION:

H362, light cruiser, CL49, St. Louis, keel laid December 10, 1936; launched April 15, 1938; delivery date March, 1939.

Hulls Nos. 363-364, two destroyers, Nos. 413, Mustin, and 414, Russell; keels laid December, 1937; **launching date December 8, 1938;** delivery dates April and June, 1939.

Hull No. 369, twin screw mail, passenger and cargo liner for United States Lines Co.; length 723', beam 92', depth 45'. Keel laid August 22, 1938.

Hulls Nos. 370, 371 and 372, three oil tankers for Standard Oil Company of New Jersey; gross tonnage about 11,500 tons; L.B.P. 525', breadth molded 75', depth molded 39'.

Hulls Nos. 373, 374, 375 and 376, four single screw cargo vessels for United States Maritime Commission; turbine propulsion; gross tonnage about 9000 tons; length 435', breadth 63', depth 40'6". Keels laid, Nos. 373 and 374, November 14 and November 28, 1938.

PORTSMOUTH, N. H., NAVY YARD
Portsmouth, N. H.

NEW CONSTRUCTION:

Six submarines, Sculpin, Squalus, Searaven, Seawolf, Triton and Trout.

THE PUSEY & JONES CORP.
Wilmington, Del.

NEW CONSTRUCTION:

Hull No. 1070, one steel hopper dredge, Chester Harding; 2,500 cubic yard capacity; length overall 308'2"; length B.P. 300'0", breadth molded 56'0", depth molded 29'0". Contract date February 14, 1938; keel laid May 15, 1938; **launching date January, 1939;** delivery May, 1939.

Hull No. 1071, one steel lighthouse tender, Lilac Class, for Dept. of Commerce, Bureau of Lighthouses. Gross tonnage approximately 700 tons. Keel laid October 17, 1938.

SUN SHIPBUILDING AND DRY DOCK COMPANY
Chester, Pa.

NEW CONSTRUCTION:

Hulls No. 172, 173 and 174, three tankers for Standard Oil Co. of New Jersey; steam turbine; 525' x 75' x 39'; 16,300 dwt. Keel laying dates April 18, May 31 and July 14, 1938; delivery dates February 1, April 11 and May 15, 1939.

Hulls Nos. 175-180, six single screw diesel cargo vessels, C-2 design, for U. S. Maritime Commission; equipped with Sun-Doxford engines. Delivery dates July 4, 1939; September 2, 1939; November 1, 1939; December 31, 1939; March 1, 1940, and May 1, 1940.

Hull No. 181, single screw steam turbo electric drive tanker for Atlantic Refining Co.; 521' x 70' x 40'. Delivery date March 1, 1940.

Taxes To Be Surveyed

Taxes! Taxes! Every businessman is talking about his tax problem. Yet no one actually knows the present tax burden on trade or industry. It is well known that the tax load on business has grown heavier in recent years, that taxes frequently absorb a large part of potential profits. Nevertheless, businessmen do not know which industries carry the heaviest burden; whether taxes bear most heavily on small, medium or large concerns; or how much tax is Federal, how much State and Local.

A nation-wide survey now being made by Dun & Bradstreet, Inc., will yield answers to these questions in addition to continuing last year's Survey of Business Trends—estimates of 1938 sales volume in various trades and industries, and inventory investment at the close of the year. Is business forging ahead, holding its own or slipping backwards? Have sales improved as much during 1938 as is generally reported? Are inventories being depleted or are warehouses and shelves still overstocked?

About the first of January two million questionnaires will be mailed to every business concern listed in the Dun & Bradstreet's Reference Book. Every manufacturer, wholesaler and retailer in the country is asked to give his experience. The questions have been prepared with the advice of leading businessmen, economists and tax experts to yield a maximum of information with minimum effort on the part of contributors.

Following last year's precedent, the results of this Business Trend and Tax Burden Survey will first be published on a summary basis, but detailed analyses of major problems and divisions will follow as rapidly as completed. However, the speed with which the information is released will depend on the promptness with which the answers are submitted, and the size of the sample available for analysis.

The results of this survey for the maritime trade and related lines will be published in this magazine as soon as the Research & Statistical Division of Dun & Bradstreet can make them available. Our readers are urged to cooperate in order that the data for this trade may be comprehensive and accurate. If you have mislaid your questionnaire, another copy will be furnished you by the nearest Dun & Bradstreet office, or by writing direct to this magazine.

PACIFIC MARINE REVIEW

FEBRUARY
1939

Hail S S Washington . .
Welcome to the Pacific!

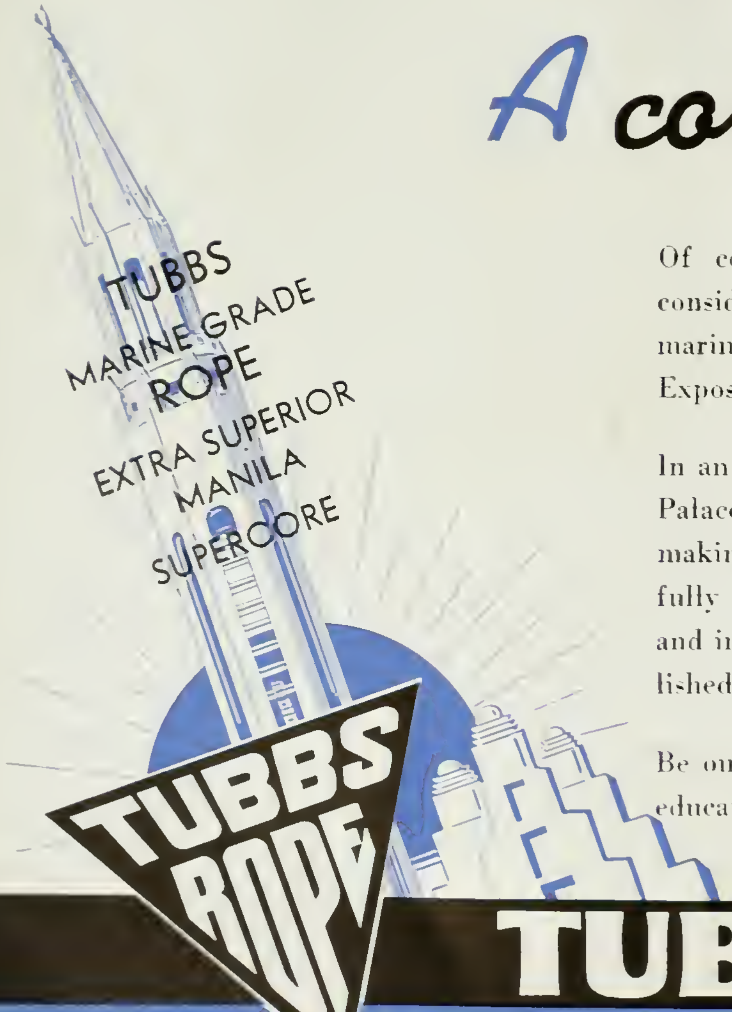
Like a nocturnal fantasy is this night picture of the South Tower of the Palace of Mines, Metals and Machinery that will house the exhibit of the Tubbs Cordage Company on Treasure Island.

A cordial invitatio

Of course you're coming to the Fair! And when you do, consider this a cordial invitation to everyone identified with the marine field to make the Tubbs Cordage Company exhibit your Exposition "headquarters".

In an aisle space of over 60 feet in the dramatically spectacular Palace of Mines, Metals and Machinery, we will have actual rope making machinery in operation. You will see, too, beautifully colored slides showing Tubbs Rope at work aboard ship and in other industries where for 83 years it has been the established leader.

Be our guest! We assure you of a cordial reception and a most educational visit.



TUBBS Cordage Co.

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SAN FRANCISCO

200 BUSH ST. SAN FRANCISCO

PACIFIC MARINE REVIEW

FEBRUARY, 1939

Official Organ

Pacific American Steamship Association

Shipowners Association of the Pacific Coast

TABLE OF CONTENTS

Editorial Comment:

Shipbuilding and Shipping 21

America's Finest Liner Visits Pacific's Finest Port 22

Your Problems Answered 26
By "The Chief."

Steady As You Go! 29
Air-Borne Damage to Sea-Borne Cargoes (III)
By Oliver D. Colvin, Werner H. E. Hahne and Mark R. Colby.

Renaissance of Pacific Coast Shipbuilding 32
A description of the C-3 cargo carriers Building at Moore Dry Dock Company.

Marine Activities in Southern California 37

Pacific Northwest Shipping and Shipbuilding Notes 38

Marine Transport Building at New York World's Fair 40

Monel Metal for Propeller Shafts of California Tuna Clipper Fleet 42

Literature of the Industry—Organization Notes 44

On the Ways 46
Latest News from American Shipyards.

The Deceleration, Acceleration and Intermittent Deceleration of Ships 48
I Deceleration.
By D. W. Dickie.

Building in American Yards 60

Miscellaneous: Engineers' Licenses, 28; Deck Officers' Licenses, 31; Marine Turbine Engineer Honored, 41; Recent Changes of Masters, 64.

PUBLISHED AT 500 SANSOME STREET . . . . SAN FRANCISCO

Entered as second class matter June 20, 1913, at the post office, San Francisco, under the Act of March 3, 1879. Published on the 1st of each month. Advertising and editorial forms close on the 15th. Subscription price, one year: Domestic, $1.50; foreign, $2.50; two years: Domestic, $2.50; foreign, $4.00; three years: Domestic, $3.00; foreign, $5.50; single copies, 25c. Chas. F. A. Mann, Northwest Representative, 1110 Puget Sound Bank Bldg., Tacoma, Washington. New York Office, Suite 404-405-406, Two Hundred Broadway, Telephone COrdlandt 7-3579.

In New York City copies of Pacific Marine Review can be purchased at the news stands of I. Goldberg, 42 Broadway; Harry Nash, 17 Battery Place; Philip Mandara, Greenwich Street and Battery Place. In Washington, D. C., at the news stand of the Carlton Hotel, 16th and K Streets.

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• MAIN GEARS ON SHOP FLOOR, READY FOR ASSEMBLY •

DOUBLE helical speed reducing gears were first run at high pitch line speeds in connection with steam turbines by De Laval over 50 years ago.

De Laval has produced helical gears in America since 1901, and up to about 1909 was practically the only producer of high speed helical gears.

A line of De Laval reduction gears for connection to multistage turbines of practically any power was developed about 27 years ago, and the gears now generally used in marine installations are similar to, and the direct outgrowth of, these pioneer gears, many of which are still in operation without replacement of major parts.

To date, over 5,000,000 hp. of De Laval gears have been supplied for the propulsion of some hundreds of passenger, cargo, naval and other ships, a number of which have each traversed more than a million nautical miles without gear troubles, repairs or replacements. When the 25,000 hp. twin screw MALOLO, for example, was recently reconditioned to reenter service as the MATSONIA, her four De Laval gears of 140 in. pitch diameter and 57 in. working face were found to be in perfect condition. Similarly, the S. S. MUNARGO, of the New York-Nassau-Havana-Miami route has covered over 2,000,000 miles with her De Laval double reduction gears, which are still in excellent condition.

DATA ON GEARED TURBINE PROPELLING EQUIPMENTS WILL BE SUPPLIED TO SHIP OPERATORS AND NAVAL ARCHITECTS UPON REQUEST

2111

DE LAVAL *Steam Turbine Co.*
TRENTON, N. J.

MANUFACTURERS OF STEAM TURBINES; PUMPS – CENTRIFUGAL, PROPELLER, ROTARY DISPLACEMENT; CENTRIFUGAL BLOWERS AND COMPRESSORS; WORM GEARS; HELICAL GEARS; HYDRAULIC TURBINES AND FLEXIBLE COUPLINGS • • • SOLE LICENSEE OF THE BAUER-WACH EXHAUST TURBINE SYSTEM

PACIFIC MARINE REVIEW

VOLUME XXXVI FEBRUARY, 1939 NUMBER 2

Pacific Shipbuilding and Pacific Shipping

Eternal vigilance seems still to be the price of success in shipping and shipbuilding, as in every other business.

Many Pacific Coast communities are working to get their share of the U. S. Maritime Commission shipbuilding program. Their efforts are based:

First, on a six per cent differential on bids for the tonnage that is to be constructed for Pacific Coast owners and for service in lines based on Pacific Coast ports.

Second, on the amended Merchant Marine Act (Subsection (f), Section 502), which allows the Maritime Commission to allot construction to various shipyards with the idea of providing for national defense and with the approval of the President, provided: that negotiated price be deemed fair and reasonable after first having secured competitive bids; that excess cost over lowest responsible bid shall be paid outright by Commission as part of national defense expense; and that the construction-differential subsidy shall be figured on the lowest bid from a responsible shipyard.

It is evident that the communities of the Pacific Coast will have to bring considerable pressure to bear in order to get adequate allocation under this clause.

On the six per cent differential clause: the immediate Pacific Coast shipowner program of construction as outlined by the Commission consists of 24 ships, of which 21 are well within the capacity of Pacific Coast yards.

According to a recent press release from Washington the 10 combination cargo and passenger vessels now under contract to be built (6 at Federal Shipbuilding and Dry Dock Co. and 4 at Sun Shipbuilding and Dry Dock Co.) are allocated, 6 to the round-the-world services of the American President Lines and four to the Puget Sound Oriental service. If this is true, these 10 ships become part of the 21 (more than one-half of the tonnage of the 21) vessels on which much of the Pacific Coast shipbuilding hope was based.

If the program continues in that direction our only hope is for a compulsory geographical allotment of Maritime Commission contracts on a proportionate basis. The Pacific slope congressmen are now lining up strongly behind this idea.

Another angle that needs watching is the operating subsidy. So far the Commission has not invoked Section 604 of the Merchant Marine Act of 1936, the section permitting the Commission to "pay additional subsidy to offset foreign government aid."

Pacific Ocean operators are up against Japanese competition, in which their competitors receive very substantial government aid. This condition makes it impossible for these American operators to figure new tonnage unless these Japanese subsidies are offset. Pressure is needed here both on the Commission and on the administration, since Sec. 604 as amended requires the unanimous vote of the commissioners after consultation with the Secretary of State.

No Termites at U. I. W.

Recent press reports on Pacific Coast shipbuilding are spreading much misinformation about Pacific Coast shipyards. This is particularly true of the pioneer yard of the Pacific Coast—the old "Union Iron Works," now known officially as the Potrero Works of the Union Plant of the Shipbuilding Division of the Bethlehem Steel Company.

This plant has been described in many recent articles as having become "a breeding ground for termites through the shameful neglect of its Atlantic Coast owners." This is the exact opposite of the truth. Bethlehem Steel Company has, during the past two years, at a cost of over $1,500,000, thoroughly remodeled this yard so that it is today an up-to-date plant that could undertake the simultaneous construction and equipment of three C-2 or C-1 type Maritime Commission standard hulls without the expenditure of any additional capital for ways or tools. The ways are ready now for three ships of any type that comes within the limiting dimensions 450 feet length and 64 feet beam.

Let's rebuild the Pacific American Merchant Marine in Pacific Coast Shipyards

AMERICA'S FINEST LINER

VISITS PACIFIC'S FINEST PORT

On the 26th of this month the United States Lines flagship Washington, largest and finest vessel in our active merchant marine, will bring in through the Golden Gate a large group of visitors for the Golden Gate International Exposition. This beautiful ship, built in 1933 by the New York Shipbuilding Corporation at Camden, New Jersey, along with her practically twin sister Manhattan, has for the past five years operated on the New York-Cobh-Plymouth-Havre-Hamburg services of the United States Lines. Washington and Manhattan are among the most popular of the transatlantic liners and regularly sell a larger proportion of their passenger accommodations than any ships in the New York-Great Britain service. The design for these vessels was developed jointly by the builder and the owner and is admitted by all experts to "combine form characteristics and propulsion plant that offer maximum propulsive economy, superb seagoing qualities, and outstanding comfort."

SOME PACIFIC COAST ITEMS

Although this vessel was built in an Atlantic Coast yard for Atlantic Ocean service there are several items in her equipment which were designed and built on the Pacific Coast. Most prominent among these, and fittingly the first item of the vessel's auxiliary machinery to pass under the Golden Gate Bridge, is the electric drive windlass (most powerful ever installed on an American commercial vessel) designed and built by the late Allan Cunningham of Seattle. This double cat windlass is driven by two 90 horsepower Westinghouse motors and each cat may be driven independently by one or both motors. Each cat is capable of hoisting one 21,560 lb. anchor and 30 fathoms of 3-7/16 inch Naco cast steel stud link chain at a rate of 5 fathoms a minute.

The Allan Cunningham windlass is now manufactured by the Markey Machinery Co. of Seattle.

Another item of Pacific Coast design and build is the electric sounding machine supplied by Louis Weule of San Francisco, two of which will be found on the bridge of the Washington.

A third Pacific Coast item, out of sight but none the less very important, is the Hough & Egbert combined feed, stop and check valve which is fitted to each steam drum of the boiler installation.

Running 22.5 knots on her trials.

On trials the eight-hour fuel consumption test was run at an average speed of 22.22 knots at 125.2 r.p.m. propeller speed, and with an average developed shaft horsepower of 33,085. Consumption of fuel oil per hour for each developed horsepower for all purposes worked out at 0.597 lbs. The steam conditions were 375 lbs. pressure and 650° F. temperature at throttle valve.

It is not our intention here to publish a complete detailed description of the Washington. That would take the full capacity of this issue. Those interested in such a description are referred to Pacific Marine Review, September, 1932, in which issue we displayed all details of the Manhattan. (Most libraries of standing keep files.) Here we wish to emphasize a few of the outstanding features.

Passenger Spaces

In passenger accommodations the Washington is in some respects quite different.

Perhaps the most noticeable of these is the large fireplace in the cabin class smoking room, which is arranged for a real wood fire and takes a huge back log.

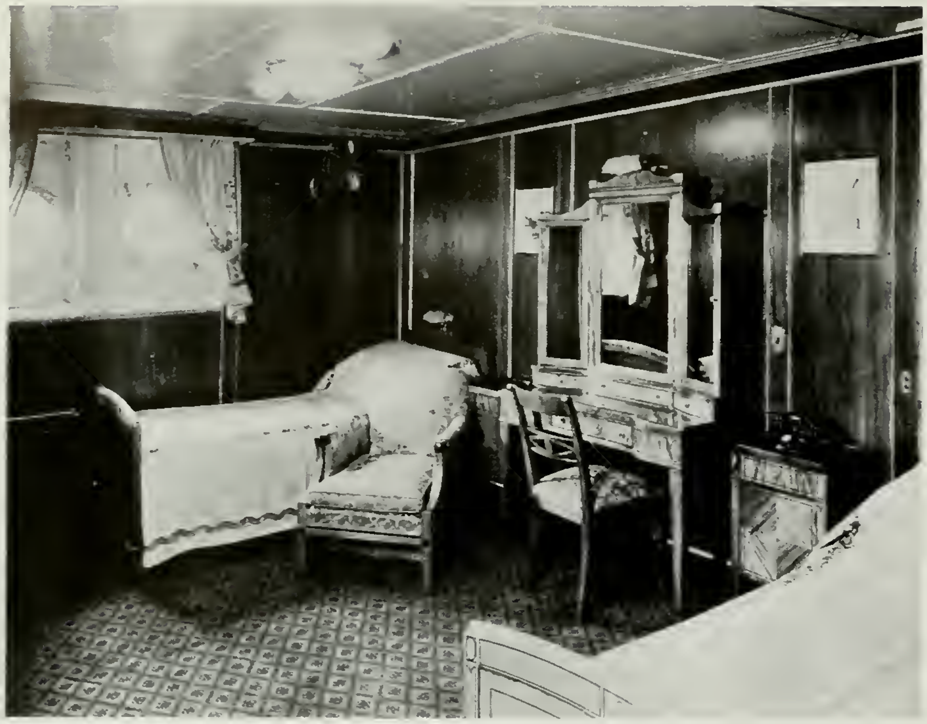
Another innovation on shipboard is the arrangement by which the curtain and screen of the stage in the grand lounge slide up into the ceiling.

The profuse use of beautiful hand wrought metal work from the shop of Oscar Bach is a unique feature in the decoration of public rooms throughout the ship.

Great height of ceiling over the entire area of the Grand Lounge and the large windows in this room will be an unusual shipboard feature for Pacific Coast visitors.

Washington's famous Palm Court is said to be one of the most exquisite rooms afloat. It has nine large full length French casement windows (three forward, three port, three starboard) which in fair weather open out so as to include in the floor space of the room a large part of the enclosed portions of the promenade deck.

At right, top to bottom: The cabin class foyer, palm court and smoking room.



Above: One of the spacious, elegantly-furnished cabin class staterooms.

Rare hardwood veneers and moldings on Haskelite panels line the public rooms.

Both cabin class and tourist class dining saloons are air conditioned by Carrier equipment.

The main galley and pantries occupy a space 80 feet wide by 105 feet long, are completely electric, and are among the most elaborately equipped afloat.

Practically all cabin class staterooms have adjoining toilet and bath. All staterooms have floors laid with cork tiling to absorb noise and vibration and are completely carpeted over this tiling.

Where paint is used on the interior or exterior surfaces of the Washington it is du Pont's "Dulux" Marine Finish. More and more ship operators, naval architects and marine superintendents are specifying this durable and beautiful finish for their floating equipment. Dulux marine finishes are scientifically compounded to maintain a surface luster and true color against salt atmosphere exposure and hard usage at sea.

Both the exterior and interior paint finish of the superstructures on S.S. Washington is an outstanding example of the beauty and quality of Dulux finishes.

Power Plant

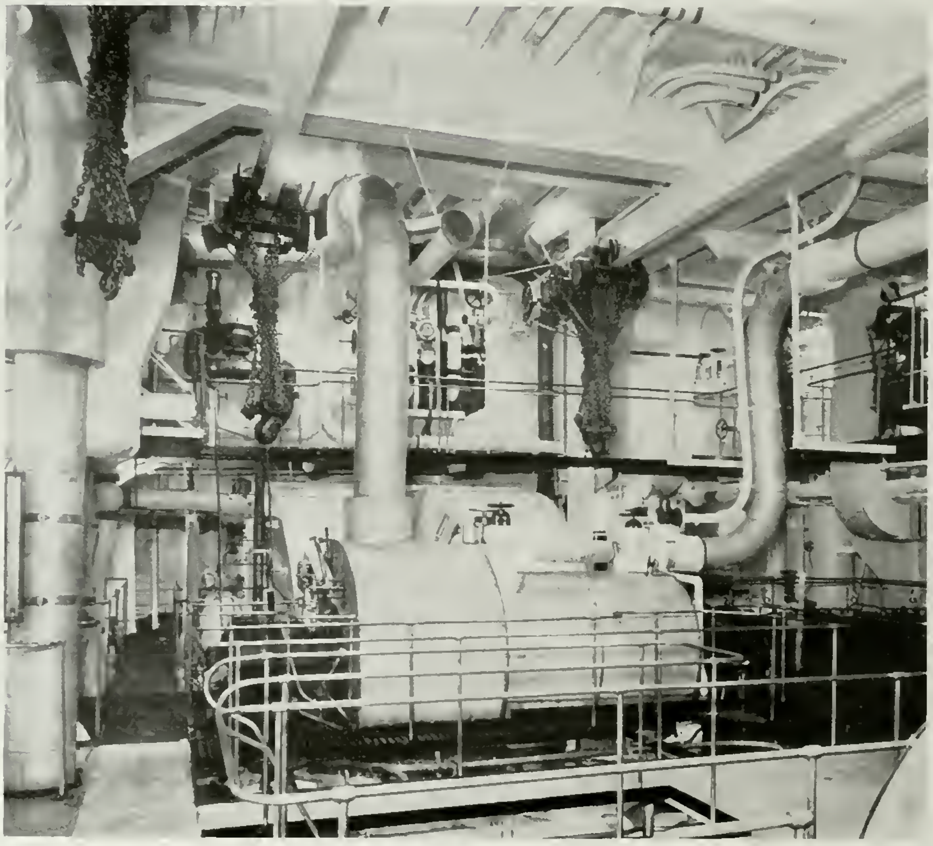
For marine engineers the following details will be of interest:

Propulsion power for the Washington is generated by the combustion of fuel oil in the furnaces of six Babcock and Wilcox water tube express type boilers which operate under closed stokehold force draft with preheated air and supply steam at 400 lbs. gage pressure and 650° F. temperature to two sets of triple expansion Parson's type, New York Shipbuilding Company built turbines, each of which drives through Falk single reduction gearing one of the propeller shafts.

All stages of these turbines run at 1500 r.p.m. for the rated 15,000 shaft horsepower of each set. The propeller shafts run at 125 r.p.m. The gears are standard double helical with a total face width of 62 inches. The main gears have a pitch diameter of 161.429 inches and the corresponding diameter of all pinions is 13.429 inches. Each pinion is connected to its turbine rotor through a jaw type flexible coupling.

Each main condenser has 16,500 square feet of cooling surface. Ambrac tubing is used. These condensers are fitted for scoop circulation

Below: Operating platform of engine room, showing one of the high pressure turbines.



with circulating pumps fitted for slow speed and harbor use. The scoops at full speed of ship and full power will maintain a vacuum of 29 inches with 70° F. sea water temperature.

Electric power for auxiliary machinery, lighting and cooking is supplied by four 240 volt, 500 KW Westinghouse D. C. turbo-generating sets with generators wired for three wire circuit, giving 240 volts for all power and galley applications and 120 volts for lighting. A diesel drive 75 KW generator and a large Exide storage battery installation take care of emergency needs. There is a total connected power load of 3250 KW and a total connected lighting load of 596 KW.

Some Statistics on this Ship

The ventilating fans have a combined capacity of 458,000 cubic feet per minute;

The water services, heating services, and sanitary services have over 25 miles of piping;

The boilers at full power will consume 18,540 pounds of fuel oil per hour;

The feed water heaters in two stages raise 335,000 pounds of water per hour from 110° F. to 300° F.;

The Mackay radio equipment can maintain uninterrupted direct day or night communication with either side of the Atlantic or Pacific from any intermediate point on those oceans;

There are 9,179 lighting fixtures, containing a total of 18,387 lamps varying in capacity from 5 to 500 watts;

There are 252 electric motors, ranging from ⅛ H.P. to 115 H.P. and aggregating 3,564 H.P.;

The 3 steel castings composing the stern post weigh 43 tons;

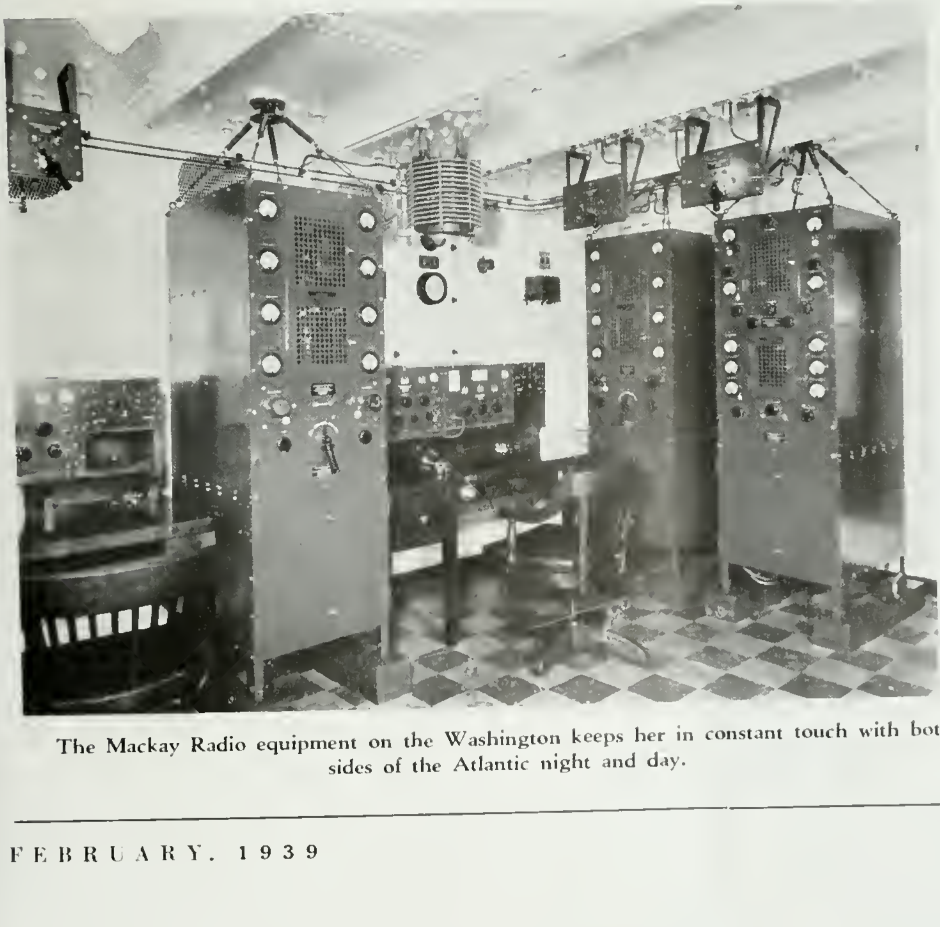
The 3 steel castings that form the frame of the balanced rudder weigh 28 tons;

The rudder stock is a single forging 24 inches in diameter and weighing 24 tons;

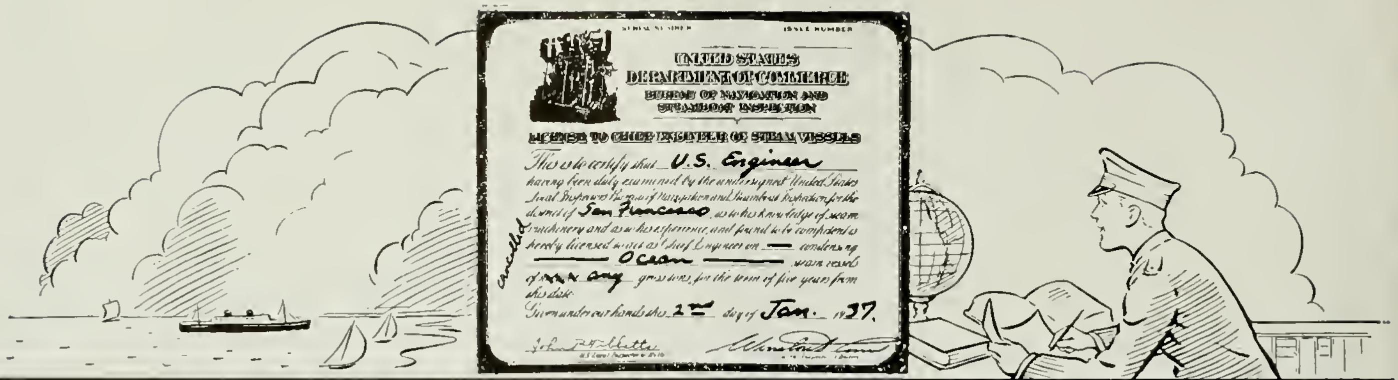
There are 28,892 pieces of specially designed table silverware in the equipment of the cabin class dining saloon.

GENERAL CHARACTERISTICS

Length overall	705 feet
Length on waterline	685 feet
Length between perpendiculars as per classification rules	666 feet
Beam, molded	86 feet
Depth to "C" deck, molded	47 feet
Depth to promenade deck	75 feet
Camber "C" deck and above, in 86 feet	6 inches
Designed load draft	30 feet
Designed deadweight on 30′ draft	12,000 tons
Displacement tonnage at 30′ 8¾″	33,500 tons
Gross tonnage	24,289 tons
Net tonnage	13,924 tons
Normal speed in service	20 knots
Shaft horsepower in service	30,000
Principal Net Capacities:	
General cargo	380,000 cubic feet
Refrigerated cargo	47,000 cubic feet
Mail rooms	19,200 cubic feet
Baggage rooms, cabin	8,380 cubic feet
Baggage rooms, tourist	5,450 cubic feet
Baggage rooms, third	2,040 cubic feet
Ship's cold stores	16,000 cubic feet
Steward's stores	7,900 cubic feet
Bunkers at 97 per cent of full tanks	4,775 tons at 38 cu. ft. per ton
Fresh water (potable)	616 tons
Fresh water (ship's use)	2,283 tons
Fresh water (reserve feed)	680 tons
Fresh water (distilled)	248 tons
Passengers:	
Cabin	582
Tourist	461
Third	196
	1,239



The Mackay Radio equipment on the Washington keeps her in constant touch with both sides of the Atlantic night and day.



UNITED STATES
DEPARTMENT OF COMMERCE
BUREAU OF NAVIGATION AND
STEAMBOAT INSPECTION

LICENSE TO CHIEF ENGINEER OF STEAM VESSELS

This is to certify that U.S. Engineer having been duly examined by the undersigned United States Local Inspectors Bureau of Navigation and Steamboat Inspection for the district of San Francisco, as to his knowledge of steam machinery and as to his experience, and found to be competent is hereby licensed to act as Chief Engineer on — condensing — Ocean — steam vessels of any gross tons, for the term of five years from this date.

Given under our hands this 2nd day of Jan. 1937.

Cancelled

Your Problems Answered

by "The Chief"

The word "Cancelled" was inscribed on face of the above license at the direction of the Bureau of Marine Inspection and Navigation. As used here it means "Specimen Copy."

I. The Centrifugal Pump

QUESTION

Describe the centrifugal pump.

ANSWER

The centrifugal pump consists of two principal parts, the rotor, or impeller; and the volute, or diffuser, or simply the casing. Associated with these parts are the shaft and drive attachments, the glands and packing, methods of lubricating and draining.

QUESTION

What is the principle of the centrifugal pump?

ANSWER

It is the principle of using centrifugal force to build up a pressure, and hence lends that name to the pump.

More particularly, it is the kinetic energy of the moving liquid at the tips of the impeller when converted from energy of motion to static energy of pressure, which gives us the head.

The old familiar formula states that kinetic energy is weight times velocity squared divided by 16.1, when weight is in lbs. and velocity in feet per second. For liquids this converts to: head in feet equals velocity squared divided by 64.4.

The important thing to note here is that the head or pressure developed on the centrifugal pump is pro-

GENERAL AUXILIARIES

Special Letter From "The Chief"

To the young man afloat who wants to improve himself:

I don't suppose there is any occupation in which it is more difficult to carry on self-improvement than marine engineering. Marine engineers on board ship are away from schools, libraries and societies, and mail delivery is irregular and at long intervals. This added difficulty should spur us on to renewed energy and determination to improve and better ourselves, especially since on shipboard we have much uninterrupted time for study.

Some of my observations in this connection are as follows:

(1) The young man must start at once on a program, because the older we get the more difficult it is to grasp new ideas. It is so much more difficult for the man past 30 to learn.

(2) Don't be discouraged because of lack of early schooling.

(3) A complete education can be gained by reading and job experience.

(4) Lay down a program of self-improvement. List the several subjects you want to progress in. Decide which one to start on first. Set aside some time of the day and of the week for reading and be very careful not to allow anything to interfere with it.

(5) Start your library by getting books on your favorite subjects. Browse through bookshops both new and second hand. Your investment will be well made.

(6) Read the technical magazines as you can get them. They do not necessarily have to be current or up to date. But at the same time be critical of articles you read. Take the position that you dare the author to convince you on what he is writing about. You will soon learn to choose and read the best and skim over the others. For instance, in this series by "The Chief," check the statements made against your experiences and look them up in reference books. Argue them with your shipmates. If not satisfied, do something about it; write to us on anything in these articles or any others.

Unfortunately the list of modern marine engineering books is very small. However, there is much in modern steam engineering, of which marine engineering is only a branch. So build up your library along general engineering lines.

I will be glad to give you names of publishers and to request them to send their book catalogs to you.

"THE CHIEF."

portional to the square of the speed or r.p.m.

A valuable approximate formula to remember is that for water the pressure in lbs. per square inch developed by a pump is $\frac{D^2 \times R^2}{8,000,000}$, when D is diameter of impeller in inches and R is the speed in r.p.m. This will vary up or down 10 per cent with different shapes of impellers.

This explains why a large change in pressure or flow is accomplished by a slight change in speed, and why the speed must be up to rating to get the rated pressure.

QUESTION

What are the two general classifications as regards the casing?

ANSWER

The volute casing and the diffuser casing. Both are designed to convert the high velocity of the liquid leaving the impeller into pressure. The volute is simpler and less expensive but not adequate for higher pressures and efficiencies. The diffuser is carefully designed to receive the liquid leaving the impeller without shock or impact, then to guide it in the direction needed, gradually increasing the area of the path of travel, so that the velocity will be slowed up. The diffuser with its curved vanes and throats may look much like the impeller.

The volute is simply a casing around the impeller, with a gradually increasing area as the discharge opening in the casing is approached. This is the common casing for low pressure pumps such as the circulating pump.

QUESTION

From the formula expressed it would seem to be possible to get necessary pressures without going to the mechanical complications of more than one pump or multi-stage pumps. Thus assume 4,000 r.p.m. top speed, a 20-inch diameter would give 800 lbs. pressure.

ANSWER

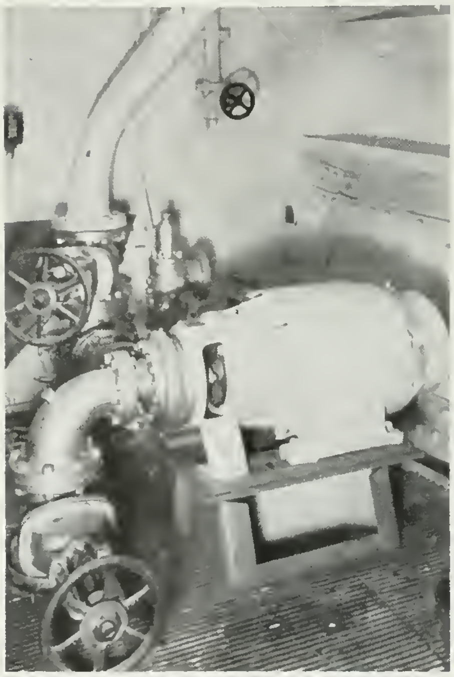
While this is true, nevertheless multi-stage pumps are very desirable and necessary for the higher pressure boiler feed pump installations. The reason is that at the higher speeds and diameters necessary the velocity of the liquid becomes too high and leads to other difficulties, such as impact and friction loss, as well as excess erosion. Thus the velocities are kept down by using more than one pump, feeding the discharge of one into the suction of the next.

QUESTION

What suction lift may be used with centrifugal pumps?

ANSWER

Usually less than with other pumps. They are usually designed for a suction head of not to exceed 15 feet and rapidly lose capacity when the lift exceeds this. High suction lifts result in air pockets, loss of prime, cavitation, excess noise and wear. There is a very interesting reason for this but difficult to cover here. Write for further details if interested.



Typical high speed, high pressure motor drive centrifugal pump.

When handling volatile liquids or hot water no suction lift should be permitted.

QUESTION

How can centrifugal pumps be used to pump out of a condenser?

ANSWER

By using low speeds, large suction openings, perhaps multi-stage, and locating them so that the water flows by gravity out of the condenser into the suction of the pump.

Provision must be made to seal the glands with water to prevent air leakage into the suction side. Also the high spot of the suction line and the pump must be vented into the condenser space. The pump must be designed to give at least 10 per cent excess head to insure steady operation. The power required to handle hot water may be 5 or 10 per cent less than the same conditions with cold water.

QUESTION

What are some standard ratings of centrifugal pumps for boiler feed service?

ANSWER

In general they are single suction multi-stage pumps, built heavier and using cast steel. They are selected for 10 to 25 per cent excess pressure over the boiler pressure, and for at least twice the boiler capacity. Several pumps should be available.

Some ratings are given in the accompanying table showing H. P. required. The sizes referred to are inches diameter of suction opening:

Gal per min.; also lbs. per hour		Discharge Pressure Lbs. per sq. inch			
		200	400	600	800
100	Size	2			
	Stage	2			
50,000	R.P.M.	3500			
	H.P.	30			
200	Size	2	2.5		
	Stage	2	3		
100,000	R.P.M.	3500	3500		
	H.P.	40	75		
400	Size	3	3	3	
	Stage	2	3	3	
200,000	R.P.M.	3500	3500	3500	
	H.P.	75	150	250	
800	Size	4	5	5	5
	Stage	2	4	6	4
400,000	R.P.M.	3500	1750	1750	3500
	H.P.	125	300	400	550

QUESTION

Why is the centrifugal pump invariably used for the circulator?

ANSWER

This application is a low head or pressure difference and large volume characteristic, the ideal application for the centrifugal pump which, with a large-mouthed, double suction impeller at slow speed, gives the best results for least power and weight.

QUESTION

What are the H. P. requirements of centrifugal pumps?

ANSWER

They are the H. P. of the fluid due to its rate of flow and head plus the losses in the pump.

More specifically, brake horsepower is equal to gal. per minute times the pressure in lbs. per square inch, all divided by 1715 times the efficiency expressed as a decimal.

The efficiency is seldom if ever better than 80 per cent, and usually runs less, down to 65 per cent.

QUESTION

What happens when a centrifugal pump is operated against a closed valve?

ANSWER

The pressure builds up to a little better than normal and the liquid is stirred and churned, the liquid friction causing heat, which soon heats it up to a dangerous temperature. If enough liquid is passed to hold the temperature down no harm is done.

QUESTION

What happens when the discharge is opened up with no pressure against it, so that the pump discharges against suction pressure?

ANSWER

The pump will overload. More than normal H. P. will be required, and a motor could be easily burned out or other injury be done to the drive. A maximum volume of liquid will flow.

Auxiliaries continued in our next article.

Engineers' Licenses

The following list shows licenses granted during the month of December to engineer officers of the merchant marine at Pacific Coast offices of the Bureau of Marine Inspection and Navigation:

SEATTLE

Name and Grade	Class	Condition
Spencer G. Bushnell, Chief Eng.	OSS, any GT	RG
Henry W. Wieggers, Chief Eng.	OSS, any GT	RG
Richard Mears, Chief Eng.	OMS, any GT	O
William W. Schweer, Chief Eng.	OMS, any GT	O
Sydney B. Wilson, Chief Eng.	OMS, any GT	O
Howard H. Hill, 3d Asst. Eng.	OSS, any GT	O
John Moll, 3d Asst. Eng.	OMS, any GT	O

SAN FRANCISCO

Name and Grade	Class	Condition
Wayne F. McNeil, Chief Eng.	OSS, any GT	RG
Allen Graves, Chief Eng.	OSS, any GT	RG
John P. Menzio, Chief Eng.	OSS, any GT	RG
Rockwell C. Church, 1st Asst. Eng.	OSS, any GT	RG
George A. Dreyspring, 1st Asst. Eng.	OSS, any GT	RG
Louis Wilkes, 1st Asst. Eng.	OSS, any GT	RG
Joseph W. Wadick, 2nd Asst. Eng.	OSS, any GT	RG
George C. Kirker, 3d Asst. Eng.	OSS, any GT	O
Paul M. Magnani, 3d Asst. Eng.	OSS, any GT	O
Harry J. Smith, 3d Asst. Eng.	OSS, any GT	O
George A. Smith, 3d Asst. Eng.	OSS, any GT	O
Silas A. Walters, 3d Asst. Eng.	OSS, any GT	O
Robert B. Black, 3d Asst. Eng.	OSS, any GT	O
Edward J. Reeb, 3d Asst. Eng.	OSS, any GT	O
Erving E. Dadman, Chief Eng.	OMS, any GT	O
Samuel D. Kendrick, 2nd Asst. Eng.	OMS, any GT	O
Carl Edward Hawkins, 3d Asst. Eng.	OMS, any GT	O

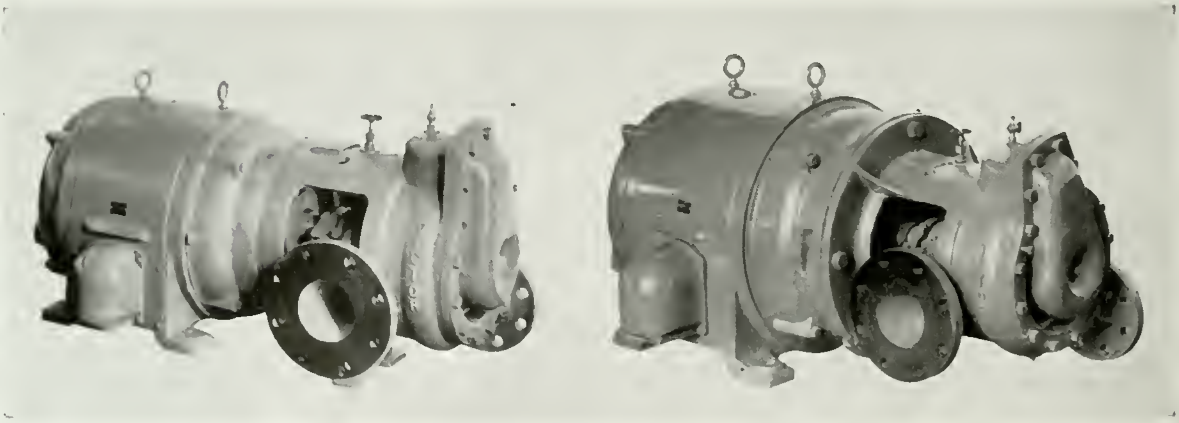
PORTLAND

Name and Grade	Class	Condition
James H. Cosgrove, Chief Eng.	OSS, any GT	RG
William H. Murphy, Chief Eng.	OSS, any GT	RG
Herbert B. Thompson, 2nd Asst. Eng.	OSS, any GT	O
Richard W. McHugh, 2d Asst. Eng.	OSS, any GT	RG
Otto J. Betten, 3d Asst. Eng.	OSS, any GT	O

JUNEAU

Name and Grade	Class	Condition
Joseph R. Feaster, 1st Asst. Eng.	OMS, 3500 GT	RG
Herbert W. Wolf, Chief Eng.	OMS, 1500 GT	
3d Asst. Eng.	OMS, any GT	RG

Abbreviations: GT is gross tonnage; RG is raised grade; O is original license; OSS is ocean steamer; OMS is ocean motorship.



A pair of motor drive centrifugal pumps for general service on board ship.

Steady as you go!

KNOWLEDGE IS THE STRAIGHT COURSE TO ADVANCEMENT

A DEPARTMENT FOR DECK OFFICERS

AIR-BORNE DAMAGE TO SEA-BORNE CARGOES

III. By OLIVER D. COLVIN, WERNER H. E. HAHNE and MARK R. COLBY

(Continued)

All Moisture Transfers Require Heat. The condensation, evaporation and absorption of moisture are inherently combined with an exchange of heat. It takes heat in order to evaporate moisture, and heat is released or must be removed when moisture is absorbed or condensed. We have seen above that heating or cooling hygroscopic products materially changes their vapor pressure, which may cause the transfer of moisture with damaging results. Also, the heating and cooling of cargoes without involving moisture may cause damage in certain goods such as chocolate, hydrogenated oils, beverages, etc.

Sources of Heat and Cold. Therefore the sources of heat and cold in ships and the principles involved in the transfer of heat through the hull of a ship, through air spaces and cargoes deserve attention.

(a) Sources of heat
- (1) Sun, atmosphere and sea water.
- (2) Steam plant, hot bulkheads and steam pipe.
- (3) Cargo loaded warm, metabolism of cargo itself, of insects and mold, spontaneous heating.

(b) Sources of cold
- (1) Atmosphere and sea water.
- (2) Refrigeration plant, cold bulkheads and pipes.
- (3) Cargo loaded cold.

Principles of Heat Transfer. The general principles involved in the transfer of heat through bodies, liquids and gases should be reviewed. Heat may be transferred by the following ways:

(a) **By conduction,** as from the sea water through the hull of the ship which it contacts and thence to other parts of the ship's structure or to goods in contact with the hull.

(b) **By convection,** as through air currents circulating between the hull of the ship and the cargo lying against the sweat battens. Another outstanding example of heat transfer by convection is the ventilation of cargoes by natural or forced drafts.

(c) **By radiation,** as from the sun to a weather deck and from the hot weather deck through the open air space below to cargo in the hold.

The amount of heat which is transferred from one location to another depends largely on the temperature difference between these two zones, the area and the thickness through which the heat is transferred, the resistance of the materials and the specific resistance between air and liquids in contact with solids. The latter factor depends on the condition of the surface through which the heat has to pass and on the convection currents in the air or liquid.

The transfer of heat through

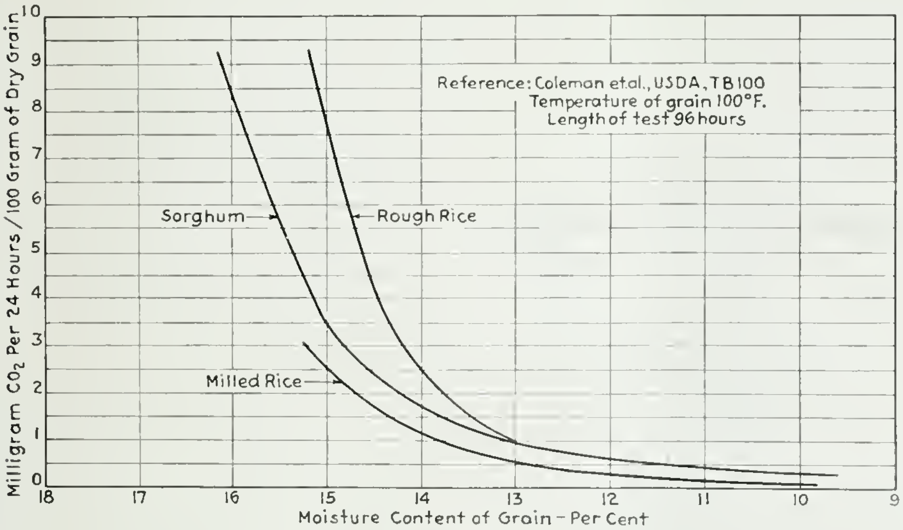


Fig. 6.

simple geometric bodies, such as a metal plate, walls of buildings, pipes, etc., has been closely studied and is believed to be well understood. Also the transfer of heat through the walls of a refrigerated cargo space has been investigated fairly well. On the other hand the transfer of heat through highly complicated systems, such as general and bulk cargoes of various descriptions, is largely unknown, though this would greatly help in tracing cargo damage. A few tentative data have been obtained by various authorities. As an illustration, one intercoastal steamship company has observed that a cargo of steel products which is about 40 degrees colder than the water in which the ship is sailing will warm up to the sea-water temperature in about ten days. Changes in temperature in canned goods have been studied by S. J. Duly, London, and indicate much slower rates of heat transfer. The transfer of heat through bulk grain and lumber cargoes and general cargo under the customary conditions of ventilation is known to be very much slower than with either steel or canned goods cargoes. It has been observed from deterioration zones in bulk corn cargoes that the cooling effect of a shaft alley became noticeable only as far as six feet away within about two months. As another example, timber cargoes stowed in lower holds in a frozen condition are known to stay that way in the center portion for many weeks.

● Respiration of Seeds and Grains

Seeds, including grains, nuts, beans, etc., when sufficiently dry, are in a true dormant condition and they may be kept in tightly sealed containers without deterioration for many years. It has been found that seeds in this condition may be heated or cooled to a considerable extent without being harmed. Also, a rapid temperature rise will not cause a harmful transfer of moisture within the bulk.

As an example of the extraordinary resistance to deterioration it has been found that barley, when sufficiently dry, may be heated to near boiling temperature without either losing its germinating power or decomposing its substance.

This valuable property of seeds changes materially with increasing moisture content. Damp seeds are not dormant, but live. This living process of seeds is, in its result, a respiration process. Actually, it is a highly complicated series of biological and chemical processes, which are very much influenced by the existing circumstances, and are commonly specified as germination, fermentation, turning rancid, etc. Most of these processes generate new water, carbon dioxide and heat.

There is no clearly defined critical moisture content below which seeds may be considered dormant and above which they respire. All seeds may be considered truly dormant below about 10 per cent moisture content, expressed in weight of moisture per weight of dry substance. However, under normal conditions of storage on land in storage houses, where ambient temperatures change but slowly, the following moisture contents are generally considered safe for several months' storage: soy beans 16 per cent, maize 14.5 per cent, wheat 14 per cent, rice 12 per cent to 13 per cent and flax seed 11 per cent.

With higher moisture content than those stated, the rate of respiration of seeds increases rapidly, as indicated by Fig. 6 for rice and sorghum grains at 100 degrees temperature. This diagram is based on the amount of carbon dioxide produced in a day's time. It illustrates also the difference between the respiration of milled rice and rough rice, which indicates that rice bran is much more likely to heat than the milled rice kernel.

● Spontaneous Heating and Ignition

Not only are seeds liable to heat spontaneously, but also numerous other agricultural, industrial and mineral substances. This subject is acknowledged to be very complex. The spontaneous heating of hay, jute and similar materials in large quantities is believed to be caused by fermentation within the plant cells and by the activity of mold fungi in the presence of moisture and a limited amount of air. Subsequent chemical reactions are started by these processes which will raise the temperature to the point of ignition. Bags of grain, such as oats, can heat till they catch fire, if a large pile is wetted, as by a flood. Oily materials such as linseed, copra, fishmeal, cotton impregnated with oils, etc., are known to be highly dangerous and prone to ignite spontaneously. This is due to the tendency of plant and animal oils to oxidize rapidly with the simultaneous generation and storage of heat. This process of oxidation is best observed with linseed oil in paints. The hardening of the paint is an oxidation of the oil, and not due to evaporation of a solvent.

The following is a list of other important commercial products which are liable to heat spontaneously: Inodorous felt, lamp black, coal charcoal, oiled materials and clothing, carbon papers, glue pieces, metal powders, hay, mixed feeds, numerous oils, copra, jute, hemp and many others.

While the hazard from spontaneous heating and ignition of many products has been proved to be considerable, it should be noted that the cause of fire is difficult to reconstruct after all evidence has been destroyed. It has frequently been stated that the careless handling of matches and cigarettes, etc., in cargo holds may have been the cause of such fires of doubtful origin. In spite of the most rigid enforcement of the "No Smoking" rule, this human weakness must be accepted as an ever-present hazard.

● Fire

Many products are likely to burn. Combustion is the rapid combination of matter with oxygen under the generation of intense heat and often with the appearance of flame. In order to burn, all matter must be heated above its kindling point, which varies greatly with the materials. Some materials ignite at normal temperatures, such as yellow phosphorus; others may ignite by striking them hard on steel, such as sulphur. Others are likely to heat spontaneously, as has been described above, until the kindling point is reached; finally, some products will ignite only if contacted by a spark or flame for a sufficient time. The bulk of all cargoes consists of the latter kind, typical of which are lumber and most products of plant and animal origin.

Once such substance is burning, it creates sufficient heat to ignite more matter, and it is well known that a small spark has frequently started a conflagration. The heat will also drive combustible gases and fumes from the burning matter, which will in turn ignite and create a flame.

All fires require oxygen in order to start or to continue. This oxygen is in most cases obtained from the atmosphere and from air contained in the pores and capillary spaces of many products. Some commercial products will give off oxygen when heated, such as saltpeter, and other nitrates, chlorates and peroxides.

A fire can be extinguished by two methods:

(1) By cooling the burning matter below its kindling point. This is customarily done by pouring water in great volume over the fire.

(2) By cutting off the supply of atmospheric oxygen from the fire. This can be done by several methods. One is to keep a cargo hold sealed tightly. The carbon dioxide, which is produced by the fire, will in due time assist in suffocating the fire. The best method known is to dilute or displace the oxygen by cheap inert gases such as carbon dioxide or a mixture of carbon dioxide and nitrogen. These methods fail with cargoes which give off oxygen.

After the fire has been arrested with inert gases, the parcel is still hot and above its point of ignition. Therefore, before air may safely be admitted to the cargo, this parcel must be cooled below this danger point. It has frequently been observed that a cargo which has seemingly been extinguished can burst into flames again after several weeks, as soon as the hatches are opened.

Deck Officers' Licenses

The following list shows licenses granted during the month of December to deck officers of the merchant marine at Pacific Coast offices of the Bureau of Marine Inspection and Navigation:

Name and Grade	Class	Condition
SEATTLE		
Robert E. Blakefield, Master & Pilot	OSS, any GT	RG
William Cleasby, Master & Pilot	OSS, any GT	RG
Emery H. Joyce, Master & Pilot	OSS, any GT	RG
Delbert J. Kelly, Master	OSS, any GT	RG
Ralph Sheldrup, Master	CWSS, any GT	O
Henry R. Sterner, Chief Mate & Pilot	OSS, any GT	RG
Stephen M. Seledee, Chief Mate	OSS, any GT	RG
Howard L. Codling, 2nd Mate	OSS, any GT	RG
Chester B. Ogle, 2nd Mate	OSS, any GT	RG
Maynard C. Tibbetts, 2nd Mate	OSS, any GT	O
Herbert C. White, 2nd Mate	OSS, any GT	RG
Richard C. Wilmarth, 2nd Mate	OSS, any GT	RG
SAN FRANCISCO		
Francis E. Diggs, Master	OSS, any GT	RG
George J. Hamm, Master	OSS, any GT	RG
Francis D. Wood, 2nd Mate	OSS, any GT	RG
Paul H. Dane, 2nd Mate	OSS, any GT	RG
Einar H. Nilsen, 2nd Mate	OSS, any GT	O
McDonnell L. Johnson, 3d Mate	OSS, any GT	O
Martin B. Burkert, 3d Mate	OSS, any GT	O
Arthur L. Holdeman, 3d Mate	OSS, any GT	O
PORTLAND		
John P. V. Syvanen, 2nd Mate	OSS, any GT	RG
Edward E. Cloney, 2nd Mate	OSS, any GT	RG
Joseph W. Dickover, 2nd Mate	OSS, any GT	RG
Curtis H. Stoever, 3d Mate	OSS, any GT	O
JUNEAU		
Erling P. Brastad, 2nd Mate	OSS & OMS, any GT	RG
SAN PEDRO		
David W. Welch, Chief Mate	OSS, 20,000 GT	RG
William A. Rogers, 2nd Mate	OSS, any GT	RG
Angus G. Parker, 3d Mate	OSS, any GT	O
Allan C. Smithies, 3d Mate	OSS, any GT	O
Herbert O. P. West, 3d Mate	OSS, any GT	O

Abbreviations: GT is gross tonnage; RG is raised grade; O is original license; OSS is ocean steamer; OMS is ocean motorship.

SPUNYARNS

● Modern Mother Goose

Mary had her little man
Insure his life one day;
The little man is dead and gone,
But Mary—she's O. K.

● Let's Have Another Scotch

Jock McPherson and family sat down to Sunday dinner.

"Now children," he said, "do ye want the cold meat or a nickel apiece?"

Three hands went up for the nickel. The meat was removed and Mrs. McPherson then served apple pie.

"Now children," said Jock, "who wants a piece of pie for a nickel?"

—Wednesday Night Life.

● Short Story . . .

"There's an office boy named John Simpkins working here. May I see him? I'm his grandfather."

"You've just missed him. He's gone to your funeral."

—The Keel.

● Safety Pins

"What caused the accident? Was the road in a wet condition?"

"No, but the driver was."

Renaissance of Pacific Coast Shipbuilding

A Description of the C-3 Type Cargo Carriers Building for the U. S. Maritime Commission at the Moore Dry Dock Company, Oakland, California

The vessel as designed is of the shelter deck type, having a raked stem and a cruiser stern, and is to be built of steel. Two complete steel decks, namely shelter and second, and fitted all fore and aft. A third deck, below the second deck, is fitted forward of the machinery space. A third deck is also fitted at its normal level aft of the machinery space in No. 4 hold. In No. 5 hold a flat is fitted at the top of the tunnel and is carried across the ship to form a third deck level.

Accommodations for the crew are located admidships.

Ship's refrigerated and dry stores are placed on the shelter deck, where they are readily accessible to the galley.

Boatswain's and other stores spaces will be found at either end of the vessel forward and aft of the peak bulkheads.

Fuel oil for normal operating conditions will be carried in the double bottoms and after deep tank. Special deep tanks are provided forward and aft of the machinery space, which may be used for the carrying of fuel for increased cruising radius, for special liquid cargoes, and for general cargo if desired.

Five cargo holds are provided, three forward of the machinery space and two aft.

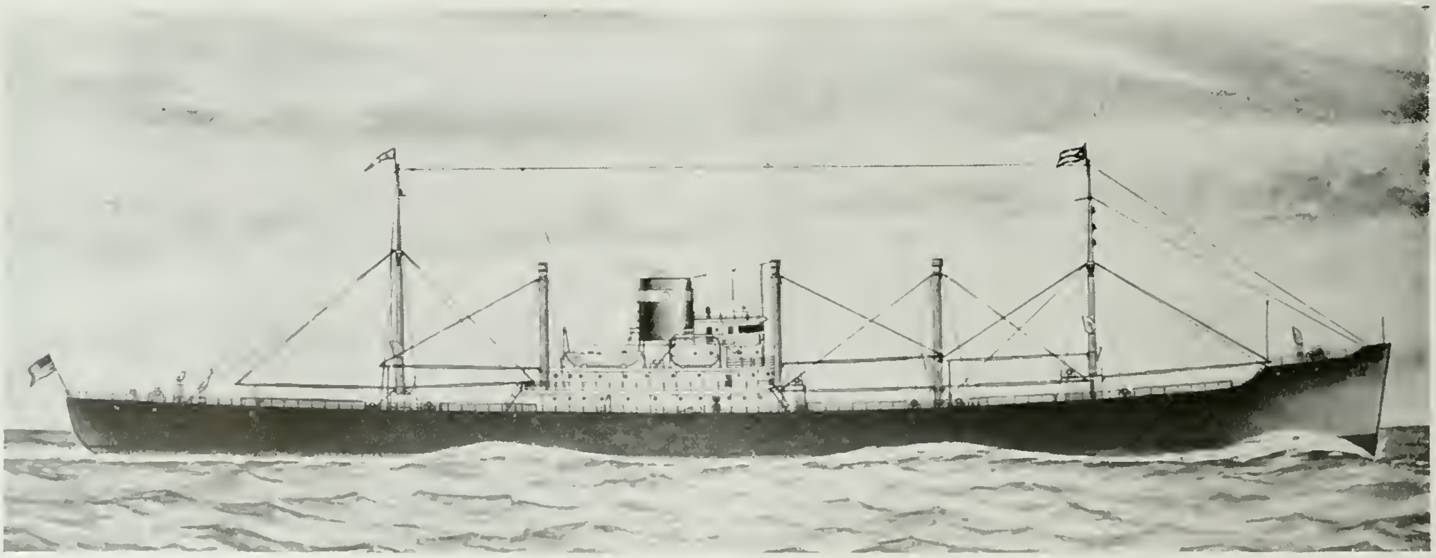
The vessel is subdivided by seven watertight bulkheads, the forward and aft collision, or peak bulkheads, being carried watertight to the shelter deck, and the remainder carried watertight to the second deck which is the freeboard deck. This arrangement of bulkheads will provide a standard of subdivision such that any one compartment may be opened to the sea without the probability of the loss of the vessel.

A tonnage hatch will be fitted in the shelter deck aft and tonnage openings in all bulkheads, except the collision or peak bulkheads, in the shelter deck spaces.

The vessel is designed as a single screw, turbine driven ship with reduction gears of the latest design. Steam will be supplied by water tube boilers which will be of oil burning type and will be operated under forced draft.

Auxiliaries in general are electrically driven and ample turbine driven generators are provided to furnish this power.

The machinery to be installed will develop 8,500 shaft horsepower at



Artist's conception of the C-3 type steam turbine drive cargo carriers to be built at the Moore Dry Dock Company.

Principal Characteristics

Length overall	492′ - 0″
Length B. P.	465′ - 0″
Beam molded	69′ - 6″
Draft, full load—molded	28′ - 6″
Prismatic Coefficient	.68
Corresponding full load displacement, approx.	17,600 Tons
Deadweight at full load displacement, approx.	11,920
Depth molded to shelter deck	42′ - 6″
Height 2nd to shelter deck at side	9′ - 0″
Height 3d to 2nd deck amidships	11′ - 9″
S.H.P. Normal	8,500
S.H.P. Maximum	9,350
Speed—sustained @ 27′ - 3″ mean draft	16½ K
Radius @ 16½ K, about	12,000 Nautical Miles
Crew, approximate	45
Gross Tonnage, approximate	7,680
Net Tonnage, approximate	4,550

its normal rating with provision for an overload 10 per cent in excess of this. The propeller is to be about 21′ - 6″ in diameter, solid type of manganese bronze, details as developed by model basin experiments.

● Fuel Consumption

It has been estimated that in order to maintain a sea speed of 16½ knots at the designed draft, with some fouling of bottom and some adverse weather conditions, 8000 S.H.P. will be required. The shaft horsepower provided in excess of this is for emergency conditions.

The consumption of fuel based on the use of 8000 S.H.P. and oil of 15° A.P.I. gravity will be 350 barrels per day, which figures at 0.616 pounds per B.H.P. hour.

● Deadweight

On a mean draft of 28′ - 7½″ to the bottom of the keel plate, in salt water, the vessel, complete in loaded condition with all equipment, outfit, and spare parts on board, is designed to have a total displacement of about 17,600 tons, and will carry a total deadweight of about 11,920 tons, of 2,240 lbs. each, made up as follows:

	Tons	Tons
Light weight of vessel		5,680
Fuel oil capacity, about	1,629	
Fresh water, about	70	
Distilled water, about	14	
Boiler feed water, about	314	
Crew and effects and stores, about	33	
General cargo, about	9,860	
Deadweight, about		11,920
Total displacement		17,600

● Cargo Handling and Details

As indicated on the plans, the vessel is divided into 5 holds for the carrying of dry cargo. The capacity of each of these holds is about as follows:

No. 1	105,593 cu.ft.
No. 2	134,141 "
No. 3	180,642 "
Over Machinery Compartment	12,276 "
No. 4	142,860 "
No. 5	110,853 "
Total	686,365 "

Based on the above capacity and the estimated cargo deadweight, there is available about 70 cubic feet of space per ton of cargo.

The holds are loaded through hatches with booms and winches as tabulated below:

Hold	Hatches Shelter Deck	Booms	Winches
No. 1	20′-0″ x 36′-0″	2	2
No. 2	24′-0″ x 30′-0″	4	4
No. 3	24′-0″ x 37′-6″	4	4
No. 4	24′-0″ x 30′-0″	4	4
No. 5	24′-0″ x 40′-0″	2	2

The shelter deck hatches are of "Tutin" type. This type of hatch does away with the necessity for usual hatch beams and expensive wood covers, but requires that tarpaulins be fitted over them to maintain tightness. Stowage of this particular type of cover is such as to leave a clear deck space for the handling of cargo.

The size of hatches on all decks has been maintained the same as those on the shelter deck, except in the case of those over the special deep tanks forward and aft of the machinery spaces. These hatches will be of special hinged design, made oil tight for the purpose of carrying liquid cargoes.

All of the above booms will be designed to handle loads up to five tons and the winches serving them will be electrically driven.

The booms are of sufficient length to load from about 18′ clear of the ship's side. There is also provision made for a 30-ton boom to be located so as to serve the No. 5 hold from either side of the vessel.

● Liquid Cargo

In some trades it is anticipated that oils of various types may be profitably carried and with this end in view provision has been made for carrying liquids in the holds as indicated.

The cargo oil tanks, incorporated in this design, have the following locations and capacities:

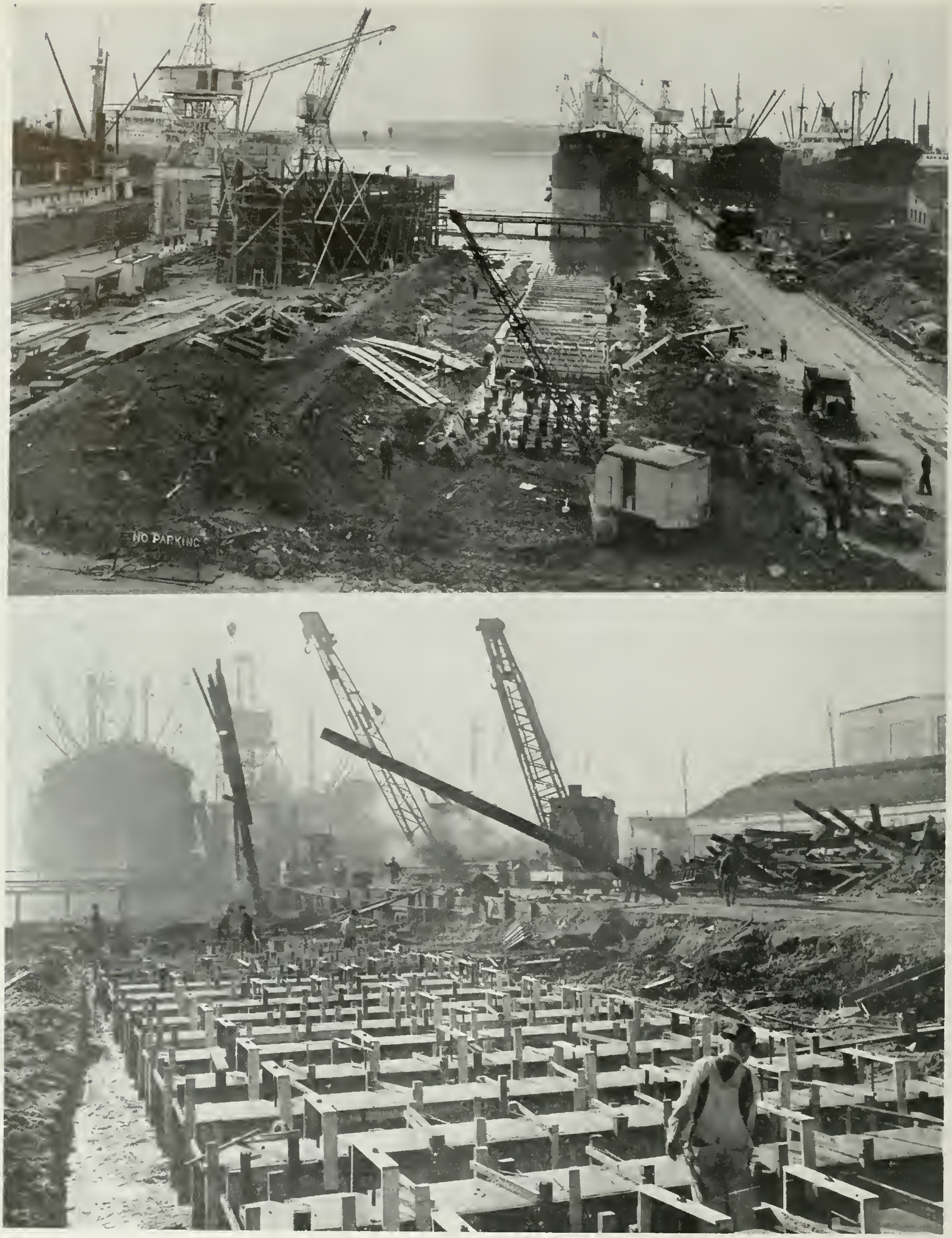
Hold	Tank No.	Capacity Tons
2	Forward	735
2	After	825
5	Forward	270

These liquid cargo spaces may be subdivided as necessary to provide a greater number of tanks. Arrangements for pumping liquid cargoes by a ship's pump may be provided if necessary.

● Cargo Fire Protection

There will be installed a complete smoke detecting system in all holds with a visual indicating panel in the wheelhouse where it may be seen by the officer on watch so that fire may be quickly located.

In conjunction with the above detecting system, a steam smothering system will be provided to aid in controlling fires which may break out in any hold. Besides being fitted in all the normal holds and 'tween decks, this system also covers those deep tanks assigned to dry cargo. Provision is made for blanking off this part of the system



Laying the foundations for C-3 ways at the Oakland yard of the Moore Dry Dock Company. Note in upper view left center the partly finished steel hull of one of the two lighthouse tenders now under construction there. Lower view is a closeup showing the forms for reinforced concrete girders cast over the ends of piles. The Moore organization is functioning on this preliminary work with an energy and a drive that promises good success in this shipbuilding contract. From the area included in the upper picture scores of fine steel vessels were launched in the Shipping Board war-time program.

in case liquids are carried in the deep tanks.

● Lifesaving Appliances

The vessel will be equipped with boats as required by the various regulatory bodies with electric boat winches to facilitate handling of the boats. Life belts, life rings and other equipment of similar nature will be supplied to meet the highest requirements for such equipment in order to safeguard the lives of those on board in case of disaster.

To aid in navigation and to help in averting casualties at sea, full radio equipment of the most modern type to the requirements of the Federal Communications Commission will be installed. Gyro compass and gyro pilot equipment as well as a fathometer for deep sea sounding will also be included in the list of navigational appliances.

● Mooring Appliances

There is an electric windlass on the shelter deck for handling the anchors and for warping the vessel while docking. Aft on this deck is a warping winch for similar usage. Throughout are located bitts and chocks of various types and sizes to aid in handling lines and in mooring. The mooring fittings have been laid out to suit the requirements of the various canal authorities in case the vessel enters such service.

● Crew's Accommodation

All the crew are berthed amidships in quarters following the high standard established by the Commission in its cargo ships.

There is installed a mechanical ventilation system supplying air to all rooms allocated to the crew, officers, and service. Heating coils are installed so that the same system may be used for heating the quarters if the same is found necessary. Radiators are to be installed in the toilet spaces for heating. A mechanical exhaust system is installed to aid in maintaining satisfactory conditions in the galley and toilets.

Separate toilets are provided for the steward's force, deck crew, engine crew, petty officers and the officers. The captain and chief engineer have their baths adjoining their staterooms and each has an office opening off his room, completing the suite.

All furniture in quarters is of the incombustible type, as are bulkheads separating the rooms and other joiner work therein. The lighting of quarters has been considered from the point of providing good lighting at each berth controlled by the individual to suit his requirements.

Galley equipment is to be electric and the laundry is provided with ample facilities for the crew.

● Main Steam Generators

The boiler selected for these ships is the Foster Wheeler "D"-Type identical in design to the Foster Wheeler boiler being installed in C-2 type steamers but with larger capacity. This boiler has built in convection superheater, economizer, and air heater, as shown in the drawing herewith.

Reference to the drawing will show that the general design of the "D"-type has been maintained, the fundamentals being a large, water-cooled furnace in which oil may be fired at high efficiency without over heating the furnace; a boiler section of vertical tubes connected to a steam drum at the top, and to a water drum at the bottom; a convection superheater placed behind a slag screen; an extended surface, marine economizer; and a tubular air heater. The combined effects are notable and include:

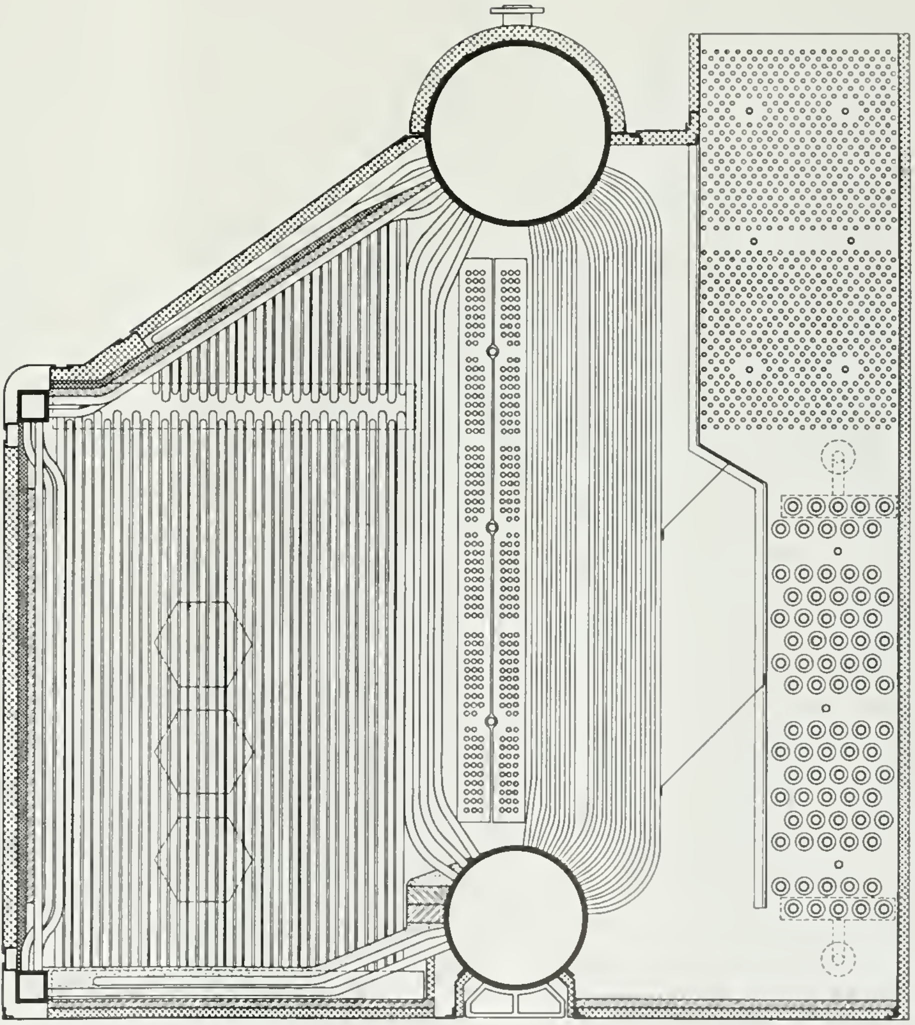
1. Maximum absorption of radiant heat from the furnace.

2. Minimum loss of heat from the furnace by radiation through the casing.

3. Minimum tendency for the accumulation of slag on the superheater.

4. Superheater accessible for cleaning from the furnace.

5. Maximum heat recovery from



Transverse sectional elevation of D-Type Foster Wheeler marine steam generator.

the furnace gases through the use of an economizer and air heater in combination.

The specifications call for an exceptionally efficient power plant on an overall basis and it is essential that the steam generating units be unsurpassed in economy of fuel. This involves high heat transfer rates and the maintenance of clean surfaces. No less than fourteen soot blowers of the most modern pattern are applied to each of the steam generators. Mechanical draft will be supplied by forced draft fans blowing air for the burners through a casing around both ends and bottom of the furnace, thus providing a cool casing and cool fire room.

● Propulsion Turbines

The main propelling units of the six C-3 cargo vessels building at the Federal Shipbuilding and Dry Dock Company, and of the two C-3 cargo vessels building at the Moore Dry Dock Company, are to be supplied by the De Laval Steam Turbine Co.

These turbines are of the cross compound type. The high pressure turbine has eleven stages and operates normally at 5012 r.p.m.; the low pressure turbine has seven ahead and three astern stages and operates normally at 3459 r.p.m. Steam is to be supplied to the throttle at 440 lbs. per sq. in gage and at 740° F. temperature, and the turbine is to exhaust to a vacuum of 28½ in. mercury referred to 30 in. barometer.

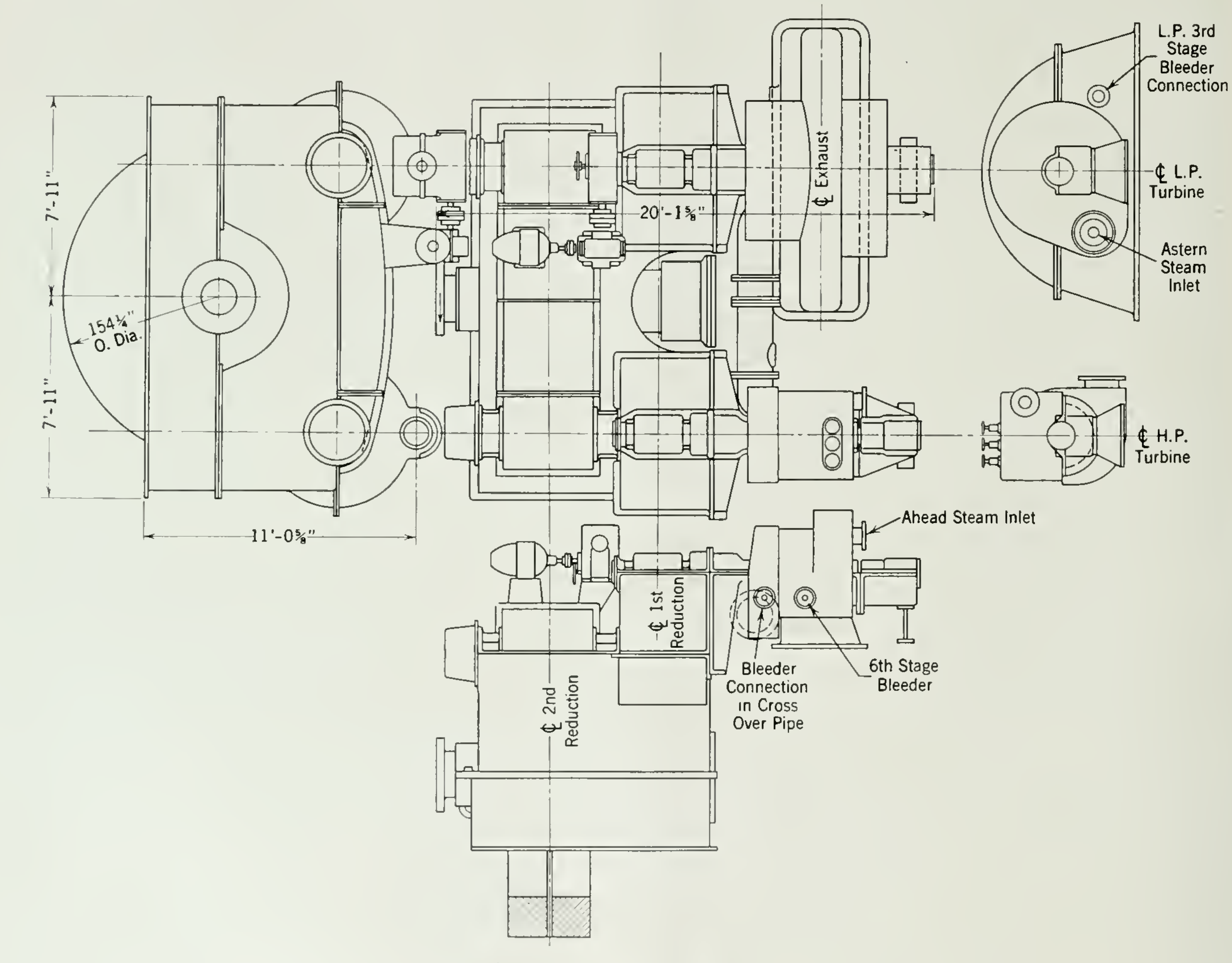
Each unit is designed to develop normally 8500 S.H.P. at 85 r.p.m. propeller speed, and a maximum of 9350 S.H.P. at 88 r.p.m.

The gears are of the double reduction, double helical type, arranged as in the accompanying outline drawing.

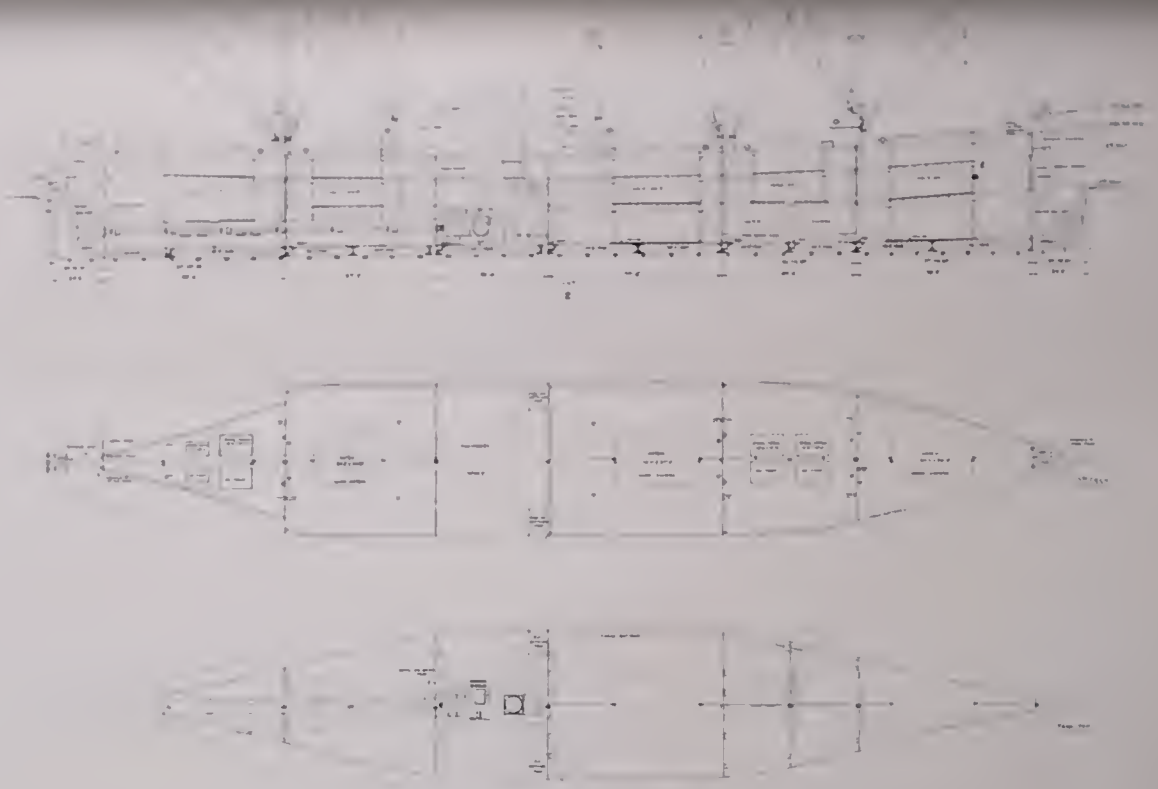
These propelling units, while of somewhat greater power, are generally similar to, and operate under practically the same steam conditions as, those now in successful operation in a large number of bulk oil tankers.

They are also of about the same power as the De Laval compound turbines and double reduction gears of the five Baltimore Line vessels recently taken into the Panama-Pacific service, but receive steam at a somewhat higher pressure and temperature.

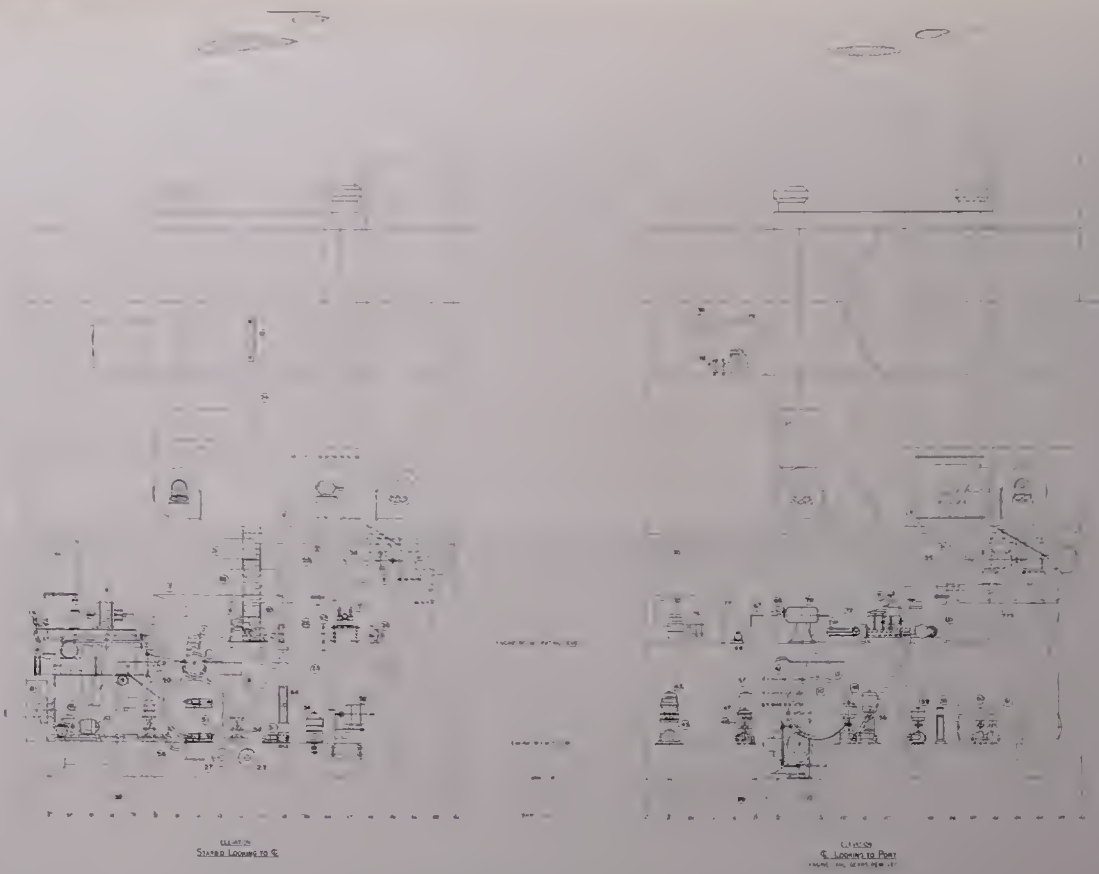
Each ship will also have two De Laval geared turbines driving auxiliary generators rated at 300 KW each, and 240 and 120 volts, the turbines running at 10,000 r.p.m. and the Crocker-Wheeler generators at 1200 r.p.m. These turbines, which have six stages, are to receive steam at the same pressure and temperature as do the main units, namely, 440 lbs. per sq. in. gage and 740° F., and will exhaust into individual condensers carrying 28½ in. vacuum.



Diagrammatic arrangement of De Laval turbines and reduction gears for C-3 type cargo carriers.

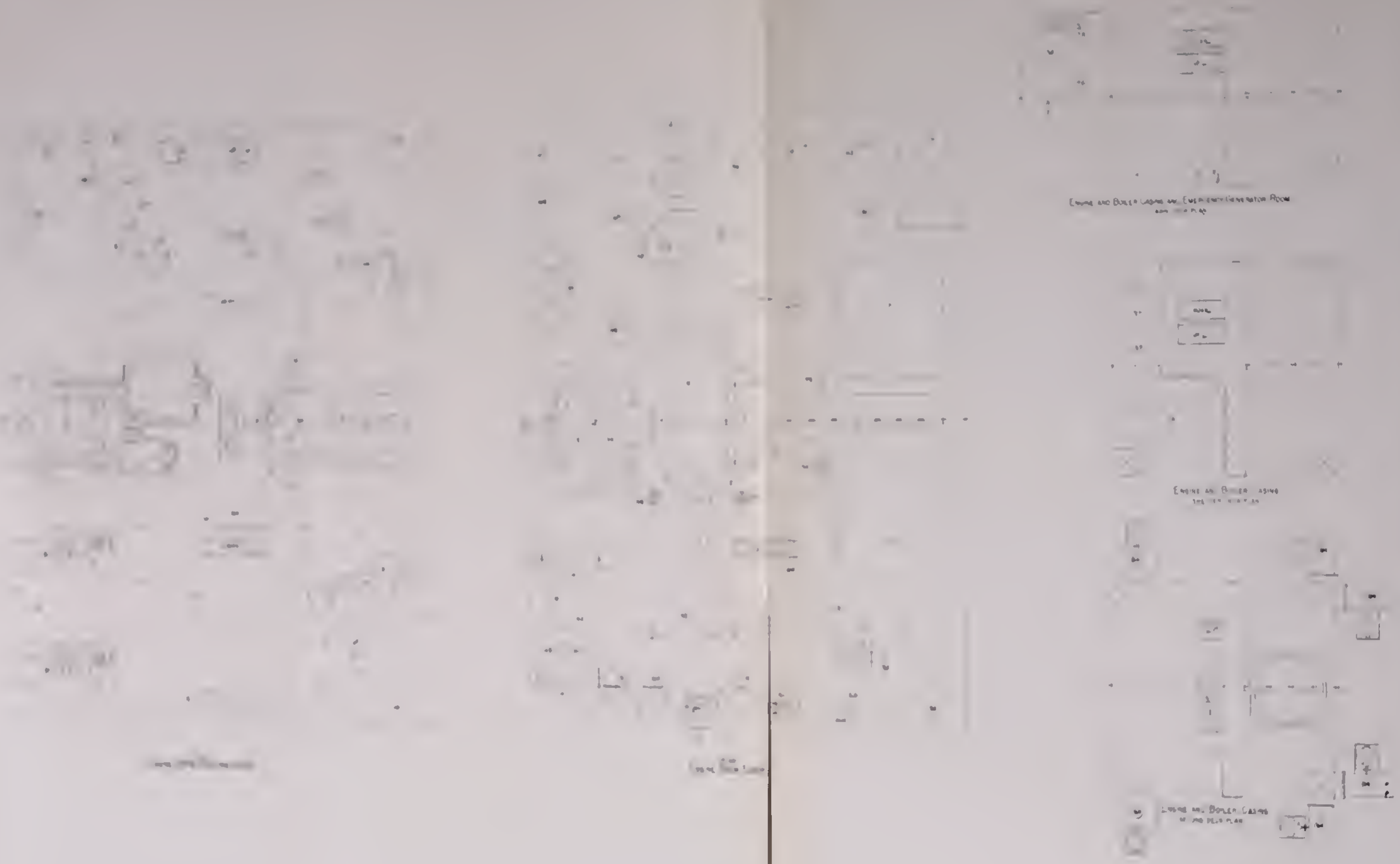


Inboard Profile and Hold Plans of C-3 Type Steam Turbine Drive Cargo Carrier.



Engine Room Machinery Arrangement Elevations. C-3 Type Steam Turbine Drive Cargo Corriers.

(For Key to numbers see reverse side of insert.)



BILL OF MATERIAL

ITEM NO	NAME OF PART	NO. REQ'D
1	HIGH PRESSURE TURBINE	1
2	LOW PRESSURE TURBINE	1
3	REDUCTION GEAR	1
4	TURBO GENERATORS	2
5	SWITCHBOARD	1
6	AIR COMPRESSOR	1
7	BOILERS	2
8	FORCED DRAFT BLOWERS	2
9	UPTAKE	1
10	HIGH SUCTION	1
11	MAIN DISCHARGE OVERBOARD	1
12	SEA CHEST	1
13	MAIN CONDENSER	1
14	AUXILIARY CONDENSERS	2
15	MAIN AIR EJECTOR	1
16	AUXILIARY AIR EJECTOR	1
17	DISTILLER	1
18	CONTAMINATED EVAPORATOR	1
19	SALT WATER EVAPORATOR	1
20	FRESH WATER EVAPORATOR	1
21	OIL AND WATER SEPARATOR	1
22	FIRST STAGE HEATER	1
23	THIRD STAGE HEATER	1
24	DEAERATING HEATER	1
25	FUEL OIL HEATERS	2
26	DRAIN COOLER	1
27	LUBRICATING OIL COOLERS	2
31	COMPRESSED AIR TANK	
32	FUEL OIL SETTLING TANKS	2
33	MISCELLANEOUS OIL TANKS	2
34	LUBRICATING OIL STORAGE TANK	1
35	LUBRICATING OIL SETTLING TANK	1
36	FRESH WATER TANK	1
37	LUBRICATING OIL GRAVITY TANKS	2
38	EMERGENCY GENERATOR FUEL OIL SERVICE TANK	1
39	LUBRICATING OIL DRAIN TANK	1
42	MAIN CIRCULATING PUMP	1
43	BILGE PUMP	1
44	LUBRICATING OIL COOLER PUMP	1
45	LUBRICATING OIL PUMPS	2
46	LUBRICATING OIL CENTRIFUGE	1
47	REFRIGERATING CONDENSER CIRCULATING PUMP	1
48	FUEL OIL TRANSFER PUMP	1
49	ICE WATER PUMP	1
50	FRESH WATER PUMPS	2
51	CONTAMINATED DRAIN & EVAPORATOR FEED PUMP	3
52	MAIN FEED PUMP	1
53	AUXILIARY FEED PUMP	1
54	FUEL OIL SERVICE PUMP	1
55	FUEL OIL SERVICE PUMP	1
56	MAIN CONDENSATE PUMP	2
57	BALLAST PUMP	1
58	GENERAL SERVICE PUMP	1
59	FIRE & SANITARY PUMP	1
60	FIRE PUMP	1
61	SANITARY PUMP SET	1
62	AUXILIARY CONDENSATE PUMP	1
63	AUXILIARY CONDENSER CIRCULATING PUMP	1
64	BOOST FEED PUMP	1
67	WORK BENCH	1
68	VISES	2
69	SCRAP BIN	1
70	WET & DRY GRINDER	1
71	SHAPER	1
72	LATHE	1
73	DRILL	1
76	REFRIGERATING COMPRESSOR	1
77	SCUTTLEBUTT	1
78	EMERGENCY GENERATOR	1
79	EMERGENCY GENERATOR SWITCHBOARD	1
80	LOG DESK	1
81	LOCKERS	2
82	GAUGE BOARD	1
83	GAUGE BOARD	1
84	BLOWERS	1

Engine Room Machinery Arrangement Plan. C-3 Type Steam Turbine Drive Cargo Carrier.

Some Recent *Shipping and Shipbuilding News* From Pacific Coast Ports

A New Shipbuilding Combination

The Consolidated Steel Corporation, Ltd., through **D. G. Henderson,** president, and **Alden G. Roach,** executive vice president, announce that plans have been made to enable Consolidated to submit bids on Maritime Commission vessel requirements.

All fabrication will be done at Consolidated's 75-acre plant at Maywood. Arrangements have been made to use the facilities of the Craig Shipbuilding Company's yard at Long Beach for the erection and assembly of the ships.

Capt. C. S. McDowell (U.S.N., retired) has been retained by Consolidated and is now cooperating in making estimates so the company will be prepared to bid on C-1 and C-2 type ships when the United States Maritime Commission releases new invitations to bid.

These definite preliminary preparations are said to be a direct result of unremitting efforts under the direction of **Owen E. Durkin,** manager of the Marine Exchange of the Los Angeles Chamber of Commerce.

● Marine Safety Conference

A Marine Safety Conference under the auspices of the Marine Section, National Safety Council, will be held in Los Angeles on February 23d at the Jonathan Club. The meeting will be preceded by a dinner at 6 P.M.

The Arrangement Committee is composed of George Prussing, Safety Director, Union Oil Company; E. J. Baird, Safety Engineer, Waterfront Employers' Association of Southern California; and Captain Henry Blackstone, Safety Engineer, U. S. P. & I. Agency, and Pacific Coast chairman for the Marine Section, N. S. C.

Guest speakers will include prominent Southern California executives from the marine and allied industries.

The meeting will be open to all interested. Reservations can be had through either George Prussing, Union Oil Company, Los Angeles; or E. J. Baird, Kress Building, 122 West Fifth Street, Long Beach.

● C. C. Moore & Co. Low Bidders

C. C. Moore & Co. of San Francisco were low with a submitted bid of $175,640 to the U. S. Navy for boiler plant improvements at the Puget Sound Navy Yard, Bremerton, Washington.

Other bidders were A. Wilson and Company, New York, $187,943; and Gerald P. McNanama and Co., Seattle, $219,650.

● Larson Launches Yankee Girl

The tuna clipper type fishing vessel Yankee Girl was launched at the boat yard of Al Larson, Terminal Island, Los Angeles, January 7 at 9 a. m. She measures 110 feet in length and when finished about March 10 will represent an outlay of $150,000. Her owner is Ed Silva

LARGE GLASS COMMITMENT IS MADE BY CHRIS CRAFT

Jay W. Smith, president of the Chris Craft Corporation of Algonac, Mich., announces that his corporation has arranged to procure its marine glass requirements for the next six months through dealers representing the Libbey-Owens-Ford Glass Company of Toledo, Ohio.

Mr. Smith said he believed Chris Craft's expanded production plans for spring, coupled with the fact that 1939 motorboat models generally are using larger glass areas, would make this the largest single commitment for glass ever made by the motorboat industry. Both laminated safety plate glass and regular polished plate glass of the Libbey-Owens-Ford lines will be used in all standard Chris Craft motorboats and custom-built craft.

● Two High Speed Fishing Cruisers

The Harbor Boat Building Co., Terminal Island, Calif., report orders for two new high speed fishing cruisers.

A BETTER MAGNET WIRE

Eliminating the need for space-consuming protective coatings in many instances, Formex wire, a new and superior magnet wire announced January 24 by General Electric at the 1939 Winter Convention of the A. I. E. E., New York City, is insulated with a synthetic resin which is tougher and more flexible than the conventional enamel coatings. The new resin is of the polyvinyl acetal type, while ordinary enamel coatings are composed of drying-oil resins. Since Formex wire requires less space for insulation and protection, it gives the designer new opportunities to reduce the size of many products. Further, electrical properties are as good as those of ordinary enameled wires, and tests show that Formex wire is considerably higher in resistance to abrasion and to the common treating solvents. When severely twisted and then subjected to a temperature of 125 C. for one hour, ordinary enameled wire cracks but Formex wire is not affected.

The superior qualities of Formex have been demonstrated in the actual manufacture of electrical products.

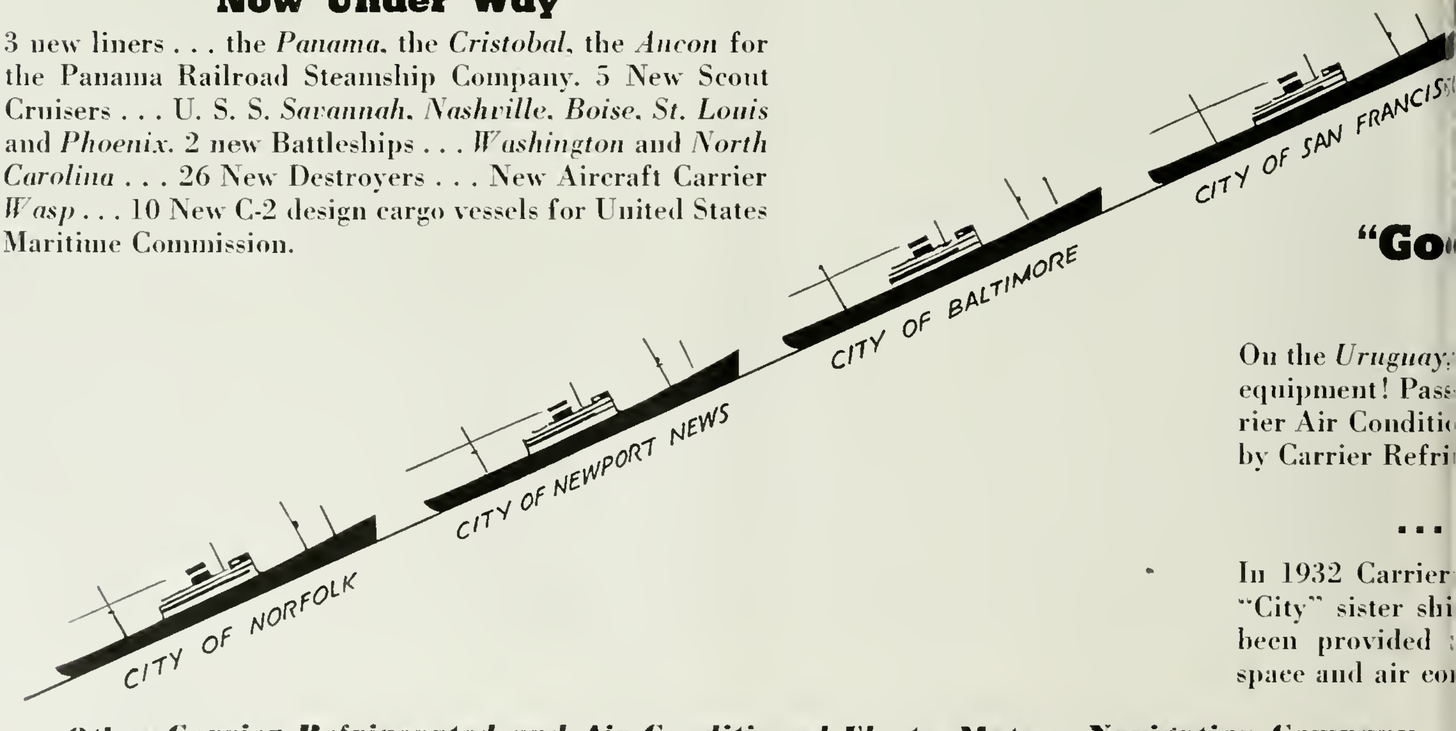
America's Premier Vessels E

NEW UNITED STATES LINER "AM

In 1930 the United States Lines selected Carrier Air Conditioning and Carrier Refrigeration for the Liners *Manhattan* and *Washington*. Now, after eight years of experience with Carrier dependability, the United States Lines *again* selects Carrier—for the newest queen of the seas, the *America*. Carrier Air Conditioning wi
ture and humidity in the *America's* ca
ing saloons—keeping the air clean and
in circulation. Carrier Refrigeration wi
stores and cargo, producing ice, and
water throughout the ship.

Other Carrier Refrigeration and Air Conditioning Installations Now Under Way

3 new liners . . . the *Panama*, the *Cristobal*, the *Ancon* for the Panama Railroad Steamship Company. 5 New Scout Cruisers . . . U. S. S. *Savannah*, *Nashville*, *Boise*, *St. Louis* and *Phoenix*. 2 new Battleships . . . *Washington* and *North Carolina* . . . 26 New Destroyers . . . New Aircraft Carrier *Wasp* . . . 10 New C-2 design cargo vessels for United States Maritime Commission.



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On the *Uruguay*
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In 1932 Carrier
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Other Carrier Refrigerated and Air-Conditioned Fleets: Matson Navigation Company -

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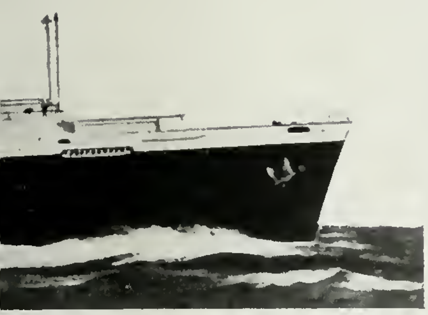

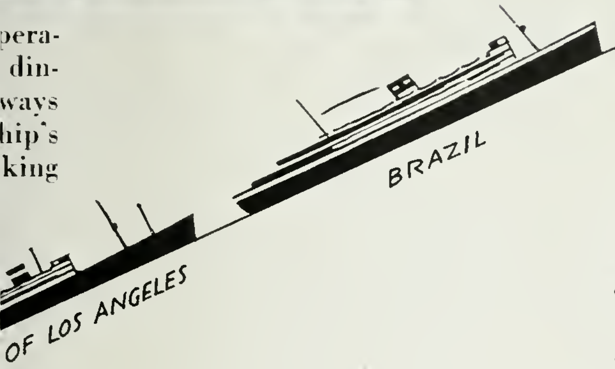

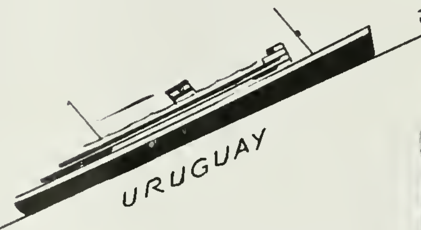

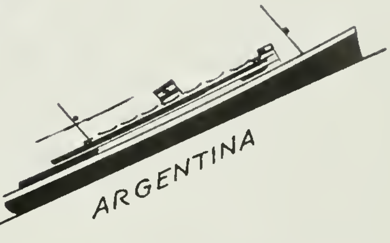

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e *Argentina*—again it's Carrier
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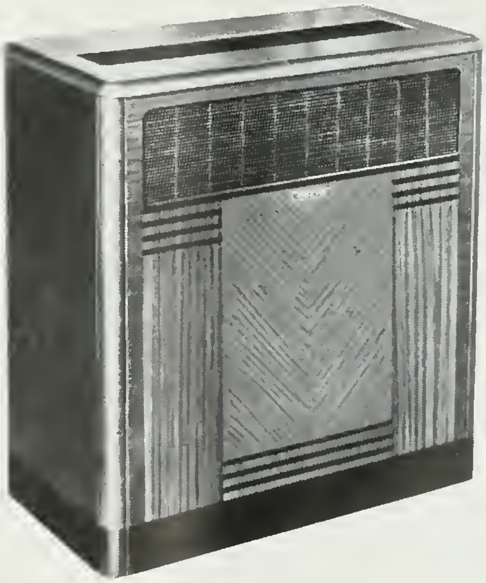
stores and cargo are protected

nama Pacific

as installed on board the five
litional Carrier equipment has
tensive refrigeration of cargo
comfort of passengers.

SALOON AIR CONDITIONER

For lounge, smoking room, bar, library, barber shop, beauty parlor and other public spaces. Complete-in-one cabinet unit the result of seven years' experience in making self-contained air conditioners. Two sizes—for summer cooling or year 'round air conditioning. All parts enclosed in compact, beautiful, deep walnut case. Occupies only a few feet of floor space. Permits location in any part of ship. Requires only three connections—and can easily be moved to new location.



PORTABLE ROOM COOLER

For staterooms and small compartments. Complete - in - one cabinet. Takes up no more space than a console radio. Cools, dehumidifies, gently circulates the air. Quiet keeps room free from smoke or odors.

Carrier Corporation

Marine Department
405 Lexington Avenue
New York City

Geo. E. Swett & Co.
58 Main St., San Francisco
Marine Distributor
San Francisco District

President Lines - Luckenbach Steamship Co. - American-Hawaiian Steamship Co.

The Cruise Voyage of AMERICA'S GREATEST LINER the S S Washington

The United States Lines luxury liner S. S. WASHINGTON will arrive in San Francisco on a special cruise to honor the West and its Golden Gate International Exposition on February 26th.

This voyage marks the first time in shipping history that an American luxury liner has been taken off its regular European run to be dispatched to Pacific waters. This vessel, rated as America's largest, fastest and most luxurious liner, usually runs between New York and Ireland, England, France and Germany.

The "around American" cruise will bring the Washington into Havana, Panama Canal ports and Acapulco, Mexico. This winter vacation cruise bids fair to attract a capacity passenger list. The February 11th sailing date out of New York brings these visitors to San Francisco shortly after the World's Fair opens its gates.

The returning voyage will have many bookings of Westerners who will arrive in New York in time to preview the big Exposition in that metropolis.

The giant trans-Atlantic liner will undoubtedly attract lively interest when she berths in Los Angeles and in San Francisco.

The most modern of ventilating systems serves both public rooms and staterooms and last but not least, air conditioned dining rooms add immeasurably to the pleasure of dining while the ship is in tropic waters.

The East-bound itinerary is:

San Francisco	Feb. 28, 6 P.M.
Los Angeles	Mar. 2, Noon
Acapulco	Mar. 5, 5 P.M.
Balboa	Mar. 9, 7 A.M.
Cristobal	Mar. 9, 5 P.M.
Havana	Mar. 12, 3 A.M.

Welcome to the Pacific . . . S S Washington!

B&W MARINE BOILERS

THE BABCOCK & WILCOX COMPANY
85 Liberty Street, New York

C. C. MORSE & CO.
450 Mission Street, San Francisco

All Blocks on

S. S. Washington

furnished by

W. H. McMILLAN'S SONS

TACKLE BLOCKS

Marine & Structural Specialties

49 SOUTH STREET NEW YORK

On the . . .

S. S. Washington:

Deck Shelter
Stateroom
Public Lounge

WINDOWS

by

Kearfott Engineering Co., Inc.

117 LIBERTY STREET NEW YORK

MARINE ACTIVITIES IN SOUTHERN CALIFORNIA

Favorable Decision for Los Angeles Shipbuilding

On January 12 the Ninth District Court of Appeals rendered a favorable decision on the separation of the Los Angeles Shipbuilding and Dry Dock Company from its parent corporation, the Los Angeles Lumber Products Company. The suit thus decided had been brought by some of the bondholders of the parent concern. This decision gives the shipyard authority to reorganize under Section 77-B Bankruptcy Act unless the appellants appeal to the higher court within 90 days.

Officials of the organization feel confident that agreement can be reached promptly with the appellants so that the shipyard can go ahead with its reorganization plans. We understand that permits to sell stock in a reorganized shipbuilding firm have already been issued but are held up pending this decision and agreement.

There is ample space at this yard for the building of 4 to 6 ships and undoubtedly there will be ample capital available to rehabilitate it and install ample equipment.

Let's build the new Pacific American Merchant Marine in Pacific Coast shipyards.

Harbor, Commerce and Shipping Committee

William Groundwater, Director of Transportation, Union Oil Company; Director of Chamber of Commerce; and general chairman of its Harbor, Foreign Commerce and Shipping Committee; announced the appointment of **W. D. Fraser** as chairman of the Foreign Commerce Section and the reappointment of **Harold Black** as chairman of the Shipping Section. Mr. Fraser on January 1 completed a very successful term of service as president of the Foreign Trade Association of Southern California.

New Direct Philippines Service

The de la Rama Steamship Company of Manila has applied for full membership in the Pacific Coast Westbound Conference. This line intends to operate between U. S. Atlantic Coast ports and the Philippines, via Los Angeles. The motorship Besholt has been chartered by lumber interests for the trip out to Manila, and on completion of unloading there will be turned over to the new line.

This is a practically new vessel built in Norway in 1936. She is 395' x 54' 6" x 29' 3", of 4500 tons gross, and powered with a M. A. N. diesel engine developing 3300 B.H.P., so that she should run about 13 knots speed.

It is reported that the line has chartered two more motorships, the Delhi (1925) and the Formosa (1921), and a steamer, the Ceylon (1911), all from the Swedish East Asiatic Company.

Los Angeles County Foreign Trade Ambassador

Stanley T. Olafson, trade commissioner for the Los Angeles County Chamber of Commerce, left Los Angeles February 1 and will arrive in London February 15 as an Ambassador of Commerce from Los Angeles to Great Britain. Prior to his departure, and in response to 1000 letters sent out by the Chamber, many Los Angeles business men appointed Olafson as their personal emissary. His headquarters will be in the London office of the Bank of America. More than 500 British importing and exporting firms have been advised in special letters that Mr. Olafson is en route and that his consultive service will be available.

This method of stimulating trade as carried on by the Los Angeles Chamber has been remarkably successful in the Orient, the Antipodes, and Latin America.

San Diegan Promotes New Shipyard

David H. Ryan, a San Diego contractor, has applied to the Harbor Commission for favorable terms on a lease of 20 acres of tide lands whereon to build a shipyard. He claims to have back of his proposals a syndicate of San Francisco, Los Angeles and San Diego capitalists, shipbuilders and contractors who are submitting bids for two of the new 6500-ton cruisers bids on which are to be opened in Washington, D. C., February 15.

Bird's-eye view, municipal piers, San Diego.

Pacific Northwest
Shipping and Shipbuilding Notes

- **Correction**

On page 61 in our January issue there appeared the following statement:

"Seattle First National Bank, owners of Wallace Bridge and Structural Steel Company (formerly Duthie Shipyards), and the Seattle Chamber of Commerce have launched a plan to raise $750,000 in cash for financing the conversion of this plant to a shipyard.

There was no intention in this notice to imply that the leadership of this movement was limited to the Chamber of Commerce and one bank. Pacific Marine Review hereby tenders apologies to the 500 outstanding leaders in Seattle's business, industrial, financial and labor affairs who, in mass meeting, launched that city-wide effort to revive shipbuilding there. One naturally feels, however, that mention of the Chamber of Commerce does imply the great majority and should imply all of such leadership.

As to ownership of Wallace Bridge and Structural Steel Company, it appears on investigation that said firm on December 7, 1937, filed a voluntary petition in bankruptcy in the United States Court for the Western District of the State of Washington, Northern Division. The Court at that time decreed the firm to be bankrupt.

We understand that the only relation held by the First National Bank of Seattle in this matter is that of trustee to the receiver.

May we add that Pacific Marine Review is in full sympathy with the establishment of commercial shipbuilding in Seattle and is actively sponsoring a united Pacific Coast shipbuilding revival movement to include Puget Sound, Columbia River, San Francisco Bay, and Southern California?

Let's by all means "Rebuild our Pacific American Merchant Marine in Pacific Coast Shipyards."

Shipways and new machine shop at the plant of Lake Washington Shipyards, Houghton, Wash., preparatory to constructing steel turbine ship Explorer, have been completed and keel laid for the new survey vessel for the U. S. Government. The new shipways were erected on the site of the outfitting dock at the west end of the plant and the new machine shop built in the center of the yard, handy to the new shipways.

Keel-laying for the Explorer took place late in January and completion time will be January, 1940. Capt. A. M. Soberialski will be inspector in charge for the Government.

The historic old steam ferry City of Victoria, now moored at the Lake Washington Shipyards, once more was in the limelight. Foreclosure of a mortgage for $175,000 against the Edmonds-Victoria Ferry Company was filed in Judge J. C. Bowen's Federal Court January 13. The old City of Victoria was brought from Chesapeake Bay in the heyday of thirsty travel to Victoria from the U. S. A., and operated two round trips per day for two seasons. She is now good only for scrap or a costly rebuild job, and marks the passing of vessels of this type from Sound waters.

A launching every ten days will be the rule during the spring for the Maritime Shipyards, Seattle, until its order for 13 Alaska fishing vessels has been completed. The Maritime yards now occupy the site of the former Gulowsen Grei Diesel Engine plant. The 13 vessels include: 76 ft. power scow, 24 ft. beam, twin 100 H.P. diesel engines for the Nakat Packing Co.; two 72 ft. fish scows for the Thompson Salmon Co. of Astoria, Ore.; three 72 ft. twin screw power scows for the same company; three 30 ft. gillnet boats for the Nakat Packing Corp.; a 60 ft. fish scow for the Ward's Cove Packing Company; a 68 ft. fish scow for the Alaska Southern Packing Co.; a 72 ft. twin screw power scow for Alaska Packers Association of San Francisco (Bristol Bay service); and a 72 ft. work scow for the Copper River Packing Company.

Tacoma-Seattle boat service will be revived when Capt. N. G. Christensen takes command of a trim new little 60 ft. x 17.6 ft. x 7.6 ft. combination freight and passenger vessel now being finished at the Berg Shipbuilding Co., Seattle. She will carry a 260 H.P. Superior diesel, have a 12 knot speed, and operate between Seattle, Vashon Island and Tacoma. She carries 150 passengers and 60 tons of freight. Recently the old steamers Tacoma and Indianapolis were sold to ship breakers, but their demise apparently did not end the Seattle-Tacoma water transportation service.

Commercial Iron Works, Portland, were the low bidders for the construction of an all steel bulk oil carrier for the Petroleum Navigation Company of Seattle for service on Puget Sound. The bid was for $155,000 and completion time of 225 days. Carl J. Nordstrom, architect, announced the following list of bidders: Todd Seattle Dry Docks, $157,000, 180 days; Lake Union Drydocks, $161,671 and 210 days; $163,625, 273 days; Winslow Marine, $167,500, 220 days; Los Angeles Shipyards, $189,500 and 155 days; Bethlethem Steel Co., $225,000 and 210 days. Bids for the power plant, a 500 H.P. diesel, show Washington Iron Works, Seattle, $25,389; Fairbanks Morse, $25,649; and the Enterprise Engine Co., San Francisco, $33,533. The vessel will be 140 x 27.6 x 13.6, of 900 tons displacement, and will have 9 knots speed loaded.

Philippines gold ore made its first appearance as a "ballast" cargo for Eastbound Pacific vessels in January when the Silver-Java-Pacific liner Bengkalis came to the Tacoma smelter with a heavy load of gold and silver concentrates. Ore and concentrates may provide revenue ballast for empty or partly loaded Pacific-Eastbound ships just as Belgian glass sand has been doing for Westbound European-Pacific Coast ships.

Seattle's huge piers, at Smith Cove, the longest commercial piers in the world, are now being finished and covered with transit sheds. The General Construction Company is finishing the dredging, riprapping and bulkheading under an $88.270 contract, and the Manson Construction Co. is working on the piling timber and paving. The two 500 ft transit sheds will be constructed so as to be ready to receive canned salmon by July 1.

The site of the former American Mail Line docks will be completely covered with salmon warehouses throughout the entire 2,500 feet of its length. Sheet piling is being used on the new project, a marked contrast to the concrete wall construction employed on earlier units of the Smith Cove project. Waste from waterway dredging goes to fill up more area of the once muddy swamp that was Smith Cove.

The 84 ft. dredge tender for the U. S. Engineers is now under construction at the plant of the Seattle Shipbuilding and Drydock Co. She will be powered with a 350 H.P. diesel and will be delivered July 3.

Fishermen protest licensed crew laws: Every fishermen's union or association of owners in the Northwest, including Alaska, "resoluted" en masse January 20 to oppose the provisions of the licensed-crew portion of the International Labor Treaty. Enforcement of the licensed crew law would ruin fishing outside of small harbors by making it too costly to operate. Attempts will be made to get the provisions changed to exempt vessels under 200 gross tons register.

Canal project revived: The Puget Sound-Grays Harbor-Willapa Harbor-Columbia River canal was revived in Congress January 20 by Representative Smith (Dem.), Wash. Asserting that this canal, which would give boats an inside passage from the Columbia River to Puget Sound, is even more meritorious than the Florida ship canal, and would be much less costly, he stated that such a canal could be built for not to exceed $33.000.000. Surveys were presented by Rear Admiral Luther E. Gregory who showed that it would be a paying proposition and open the Columbia River log markets to Puget Sound sawmills.

G. W. (Jack) Killiam is the new president of Seattle Transportation Club, succeeding **Alex D. Stewart**. The new vice-presidents are **M. K. Matthewson** and **Ernest T. Falk**. **John Barthrop** is secretary-treasurer and **R. M. Wolf** and **Edward Titegen** are directors.

● Todd Tacoma Yard for Hulls

A campaign started at Tacoma last August to bring shipbuilding activity to that city became a step nearer to realization upon the receipt of the following telegram from **R. J. Lamont**, president of the Todd Seattle Drydocks, Inc.:

"Todd Seattle Dry Docks Incorporated announces today (Jan. 24) that the General Shea Columbia Company and associates and Todd Seattle Dry Docks Incorporated are considering the desirability of preparing for the construction of steel merchant vessels for private interests as well as for the United States Maritime Commission. The plans under consideration contemplate using the Tacoma property of the Todd Company and combining operations with the Todd Seattle plant at Harbor Island.

● Puget Sound Oriental Service

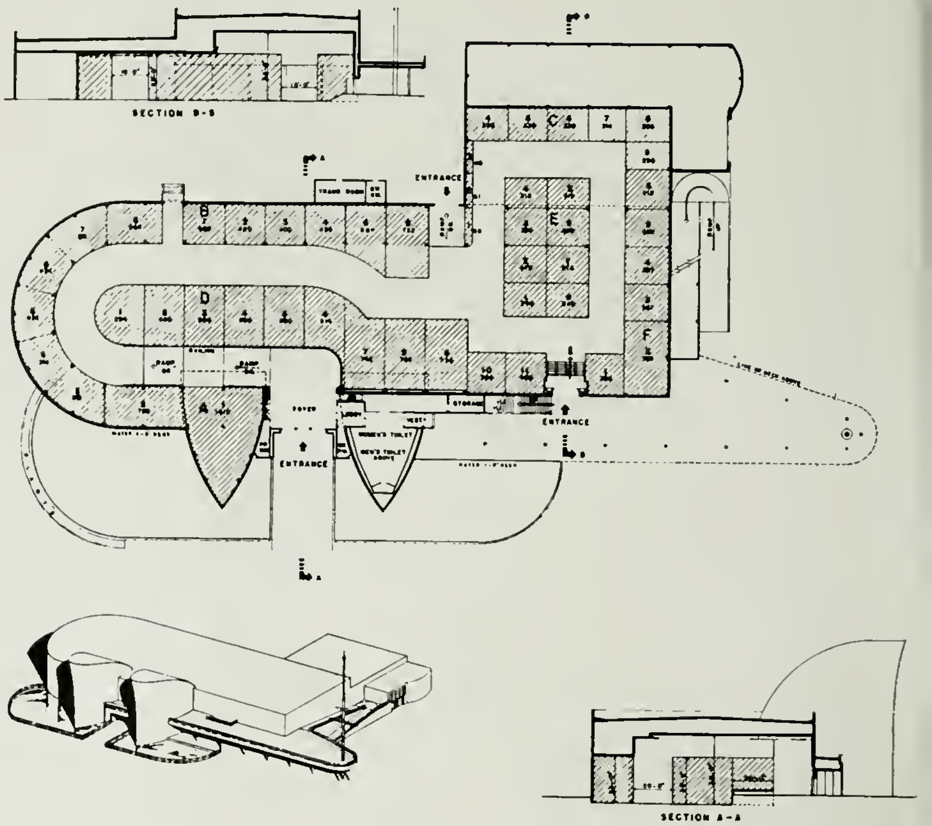
P. E. Harris (business man), **J. W. Spangler** and **Joshua Green** (bankers) recently were named by the advisory committee of the Seattle Chamber of Commerce as a special committee to further the plans of the Seattle civic group endeavoring to establish an American flag service in the Puget Sound-Orient trade.

The committee, accompanied by **Col. W. C. Bickford**, chief engineer and general manager of the Port of Seattle, and **Fred Marvin**, president of the Port of Tacoma, have left for Washington, D. C.

Seattle's huge Smith Cove piers, shown here, are now being finished.

Marine Transport Building At The New York World's Fair

First Building For This Purpose At Any International Exposition



Plan, two transverse sectional elevations, and an isometric drawing of the Marine Transport Building.

The Marine Transportation Building at the New York World's Fair has been completed by the Fair Corporation and has been taken over by the Maritran Corporation, a non-profit organization sponsored by leaders in the marine industry for the sole purpose of presenting an exhibit commensurate with the importance of the industry.

This building, the first in any fair to be devoted exclusively to marine activities, is located in the transportation area, immediately adjacent to the Aviation, Motor and Railway Buildings. As shown in the plan herewith, it is approximately 400 feet long with a width of 175 feet, has an exhibit area of approximately 23,000 square feet, and occupies property extending over three acres. On either side of the main entrance twin bows of super liners rise from the water to a height of 80 feet, and entrance to the building is over a gangway crossing waters surrounding these vessels.

Inside the building everything will suggest ships and the sea. The focal exhibit will consist of a depressed illuminated map of the world with an area of 1,800 square feet, upon which the trade routes of all American lines will be shown. On these trade routes will be miniature vessels of the various lines and, through a magnet control operated by wireless signals, the position of the vessels will be changed daily to correspond to the position of the ship at sea. Thus every visitor will be greeted with an impressive presentation of America's world-wide fleets, which are daily rendering service in home waters and in foreign seas.

Paralleling this focal exhibit will be the exhibition booths of the principal steamship lines whose representatives will be available to give full information regarding their respective services.

Shipbuilding and allied industry exhibits will show the various stages of ship construction, from the laying of the keel to the launching, cross sections and interiors of ships, harbor facilities in the various ports, navigational and propulsion equipment. Special emphasis will be given to the safety and comfort surrounding sea travel.

Occupying a central position on the main floor will be an extensive exhibit of models and pictures which will depict the development of American shipping from the landing of the Pilgrims up to the modern cargo and luxury liners of today. This exhibit will also include models of Navy, Coast Guard, Lighthouse Service and War Department vessels. Bordering this area booths have been allotted to Great Lakes and inland waterways exhibits, navigation and propulsion equipment.

The Marine Transportation Building offers a unique opportunity to educate millions of our people to the needs of the American merchant marine, and to carry the message of the

American shipowner to a large part of the people who cannot be reached as well, if at all, by any other means. Of special interest will be the educational lectures and motion pictures showing the construction of modern ships, their operations and service, as well as their ports of call and the various services required from source of cargo to its destination. Special programs and prizes for children will be offered with the purpose of developing interest in our shipping. Interesting the voters of tomorrow will bring to the building the voters of today. The entire industry will benefit from the publicity which will be given this building and the exhibits.

To many of our people their New York World's Fair visit will be their first to any seaport. This is the logical time to enlist their interest and cooperation in the American merchant marine.

Marine Turbine Engineer Honored

The Holley Medal of The American Society of Mechanical Engineers has been awarded to Francis Hodgkinson, honorary professor of mechanical engineering at Columbia University and former associate of George Westinghouse, for "meritorious services in the development of the steam turbine." The award was made during A.S.M.E. Honors Night ceremonies at the Engineering Societies Building, 29 West 39th Street, New York City.

Mr. Hodgkinson, who has contributed more to the evolution of the steam turbine in this country than any other one man, and who is one of the outstanding figures of the engineering profession, retired as consulting mechanical engineer of the Westinghouse Electric & Manufacturing Company, after forty years of service for that company, in February, 1936.

He was born in London, England, June 16, 1867; was educated in the Royal Naval School, New Cross, England, and Armstrong College, Newcastle, England; and was apprenticed in 1882 to Clayton and Shuttleworth, Agricultural Engineers, Lincoln, England. In 1885 he became associated with Sir Charles Parsons in the early development of the reaction steam turbine.

In 1896, when George Westinghouse negotiated a license agreement with Sir Charles Parsons, Mr. Hodgkinson, at the latter's recommendation, came to the Westinghouse Machine Company to initiate the designing and construction of steam turbines. He became chief engineer of the Westinghouse Machine Company in 1916.

Mr. Hodgkinson has received the following honors: 1904, Silver Medal by the Louisiana Purchase Exposition, St. Louis; 1925, Elliott Cresson Gold Medal from the Franklin Institute of Philadelphia; 1931, Willans Gold Medal from the Institution of Mechanical Engineers and the Institution of Electrical Engineers of Great Britain; 1935, honorary degree of mechanical engineer from the Stevens Institute of Technology.

He has been a member of the American Society of Mechanical Engineers since 1902, and was made chairman of the A.S.M.E. committee on power test codes in 1937. He is also a member of the Institute of Mechanical Engineers of Great Britain, Engineers' Society of Western Pennsylvania, and associate member of the American Institute of Electrical Engineers.

The Holley Medal has been awarded to the following men: 1924, Hjalnar Gotfreid Carlson; 1927, Elmer Ambrose Sperry; 1929, Baron Chuzaburo Shiba of Japan; 1934, Irving Langmuir; 1936, Henry Ford; 1937, Frederick G. Cottrell.

An aerial view of the New York World's Fair, showing its relation to the city of Greater New York. The Marine Transportation Building is slightly above and a little to the left of the exact center of this picture.

Monel Metal For Propeller California

Above and below: Typical California tuna clipper type boats. There is great rivalry among owners as to speed, equipment and sea qualities.

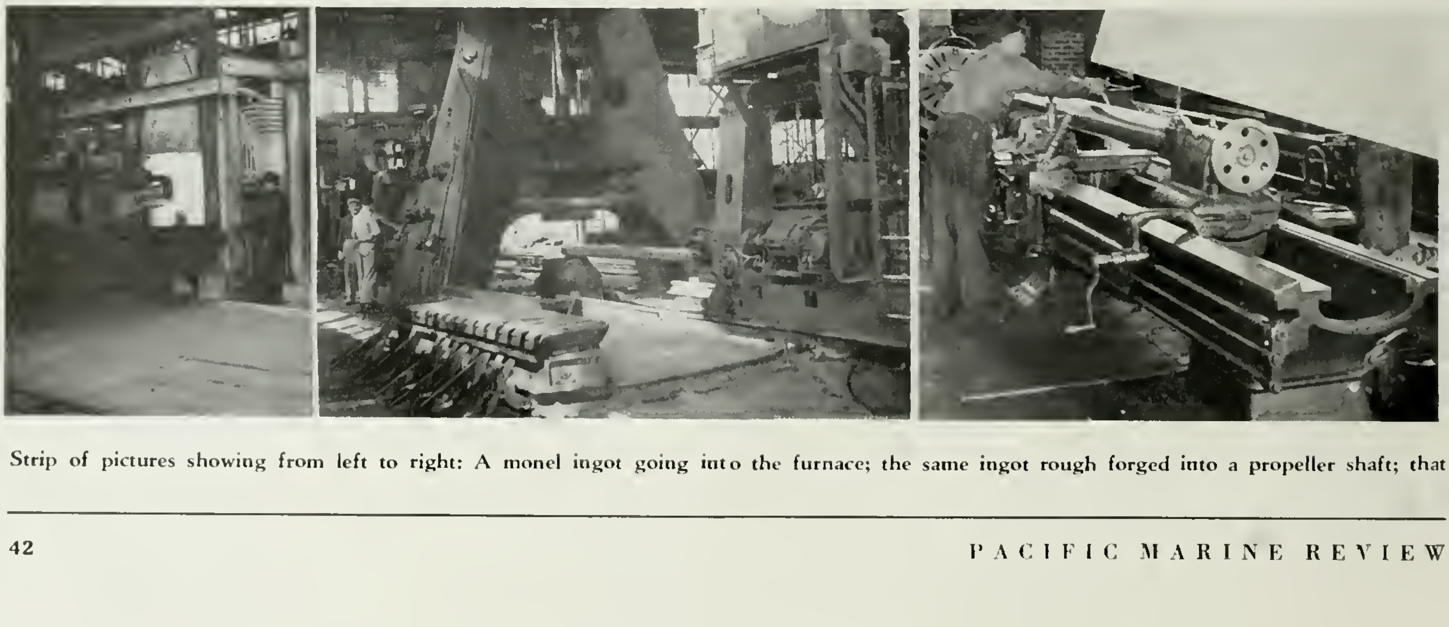
On the large tuna clippers which work out of Southern California ports and often have to run far south into tropical seas the corrosion of steel propeller shafts has in recent years become an increasingly expensive factor in operation expense. On new vessels this problem is now being solved by the use of monel metal shafts. These shafts are high in first cost but once in they are good for the life of the vessel and become a guarantee against costly delays. Monel metal has shown itself to be so dependable in this business of deep sea fishing that a number of the older boats are using it in replacing their steel shafts.

The largest monel metal shafts installed in these tuna boats are those for the Normandie and Queen Mary, which vessels are 149′ 6″ overall length and are powered by Union directly reversible diesel engines rated 800 shaft horsepower at normal speed. These tail shafts are 7½ inches in diameter by 21 feet long and each was forged in one piece from an ingot of pure monel.

Our illustrations show a sequence of operations in the production and installation of a monel propeller shaft 6⅜ inch diameter by 18 feet long. The ingot, weighing 3300 lbs., is charged into the furnace by a floor charger and heated to 2150° F. in a pyrometrically controlled gas flame.

After the ingot has been uniformly heated to the required temperature it is drawn out of the furnace by the floor charger and transferred to a manipulator, which handles it through the forging process while it is being reduced to rough round and lengthened to approximate dimension required.

The rough forged shaft is next rough turned to plus a thirty second of an inch over finish dimensions and



Strip of pictures showing from left to right: A monel ingot going into the furnace; the same ingot rough forged into a propeller shaft; that

Shafts of Tuna Clipper Fleet

then shipped out to the shipyard, where it undergoes final finish machining to exact dimensions.

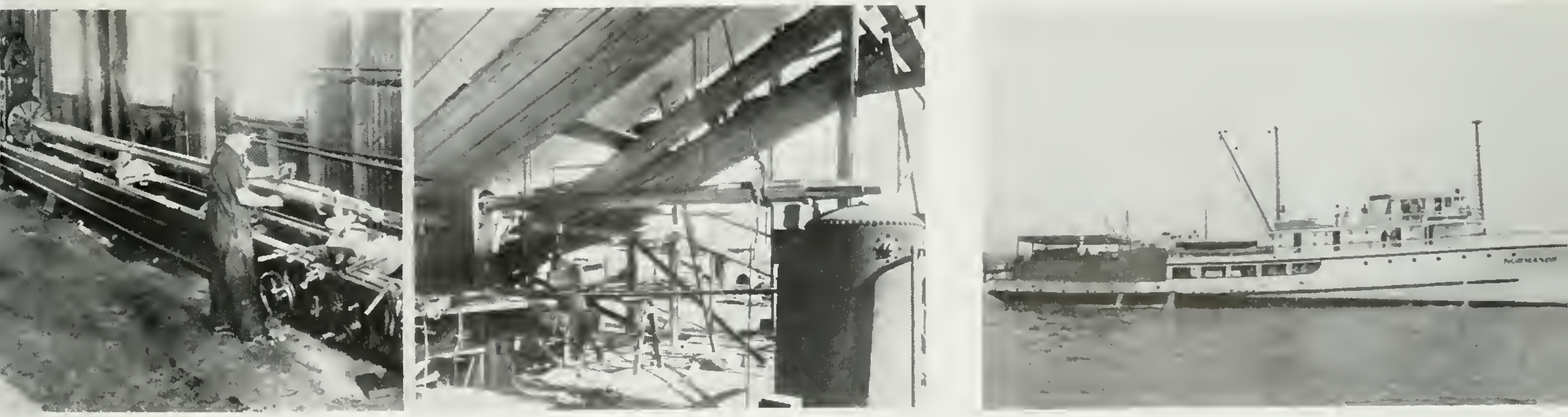
Usually on installation the shafts are fitted with centrifugally cast monel sleeves at the stern bearing and the inside stuffing box.

The large tuna clippers now have as much as 10,000 miles cruising radius at 11 knots sea speed and they range from Puget Sound to South America and West to the Hawaiian Islands.

The tuna fishing boats fitted with monel shafts include the motor vessels:

Picaroto
Belle of Portugal
City of San Diego
Cabrillo
Sao Joao
Cape San Vincent
Queen Mary
Normandie
American Beauty
Victoria
Navigator
Rajo
Conte Bianco
Mayflower
Azoreana

Azoreana, Mayflower and Normandie, three of the more recent additions to the California tuna clipper fleet.



shaft being rough machined; that shaft being finished; that shaft being installed in the stern of a tuna clipper; and a clipper ready for sea.
(Courtesy of International Nickel Company, Inc.)

Literature of the Industry

AND ORGANIZATION NOTES

Equipment Standards, Parts I and II, a 28-page, 8″x11″ booklet with many tables and graphs, published by the Refrigerating Machinery Association, Washington, D. C.; price 50 cents net.

These equipment standards represent the first of a series to result from the broad standardization program which the Association initiated a year or so ago.

The table of contents indicates that Part I deals with ammonia equipment under the following headings: Enclosed Ammonia Compressors, Vertical Open Shell and Tube Ammonia Condensers, Horizontal Closed Shell and Tube Ammonia Condensers, Horizontal Closed Ammonia Shell and Tube Brine Coolers (Flooded), Submerged Open Ammonia Brine Coolers, Ammonia Liquid Receivers, Ammonia Mains, Steel and Wrought Iron Pipe, and Cold Storage Room Insulation.

Part II covers the results of the first studies of Freon equipment, with the following section headings: Low Pressure Condensing Units (Accessories Recommended for Base Units), Freon-12 Condensers (Terminal Difference), and Freon-12 Water Coolers (Mean Temperature Difference).

Fact Book of Flexible Metal Hose and Tubing, a 20-page booklet published by the Flexible Metal Hose & Tubing Institute. A new booklet which, for the first time, presents a complete factual story of these important products while graphically portraying their almost unlimited usefulness in meeting many of industry's most difficult design, construction and maintenance problems.

This booklet also lists and illustrates principal types and forms of flexible metal hose and tubing for the information of design engineers and users. It explains the thoroughly proved underlying engineering principles which have made possible the development of flexible metal hose and tubing and why these principles result in unique performance characteristics which make this type of hose and tubing the only satisfactory solution to some problems and the most satisfactory and economical solution to many more.

This booklet should prove interesting to every plant executive who uses hose and tubing in his maintenance work, to all industrial executives whose manufacturing production or distribution problems involve the handling of steam, gases, hot or cold liquids and certain solid or semi-solid materials, and also to design engineers who will find many opportunities for further product development in the unique combination of characteristics that flexible metal hose and tubing possess.

Single Suction Multistage Pumps, a 36-page illustrated catalog issued by the De Laval Steam Turbine Co.

In this type of centrifugal pump, which is widely used for feeding high pressure steam boilers and other high pressure service, the individual impellers are unbalanced axially, necessitating the use of a thrust bearing or else some form of hydraulic balancing device. In the De Laval pump, this is a disk subject to discharge pressure upon one side and to an automatically controlled reduced pressure upon the other and having close axial clearance, but no contact, with the casing. Its advantages, as compared with the drum type of balancer, are explained by a numerical example.

The De Laval pump is also distinguished by labyrinth wearing rings to reduce leakage from discharge to suction and by a horizontally split casing which renders interior parts readily accessible, also by solid, one-piece diaphragms between stages.

The catalog illustrates and d scribes in detail all the parts of thes pumps and many of their applica tions.

Micromax Condensate Purity I struments for the Steam Plant, 20-page illustrated catalog issued b Leeds & Northrup Company Philadelphia, is numbered N-95-16 and is offered to executives, eng neers and operating men concerne with steam generation, whether f power or process use.

It shows how a knowledge of co densate conditions helps to effe important operating economies. describes a reliable electrical met od for continuously determinin variations in condensate purity. also describes Micromax recorde which automatically draw a cha record of condensate condition and, if contamination occurs, act ate an alarm to warn operator o in addition, operate a motorize valve to divert impure condensa to waste. Illustrations inclu typical applications.

GEA-2964, a brochure describin and illustrating the **General Electri** full voltage magnetic motor starte

W-200-B4, an illustrated bulleti describing the **Worthington** hydra lic tube washer for surface co densers.

W-450-B19C, an illustrated bull tin describing **Worthington** dee well type turbine pumps.

W-475-M2, an illustrated bulleti describing **Worthington** rotar pumps for cargo unloading. Cap cities 500 to 5000 g.p.m. Pressure to 150 lbs. per sq. in. Viscosities t 500,000 S.S.U.

Shield-Arc-Welders, a 20-pag profusely illustrated booklet pu lished by the **Lincoln Electric Com pany** and describing their latest im proved electric welder with sel indicating dual control so as to giv the right art to suit each job at th maximum economy.

FIREMAN'S FUND COMPLETES RENOVATION

Fireman's Fund Insurance Company and affiliated companies have now fully completed their remodeled head office quarters at 401-433 California Street. The company purchased the building at 433 California Street in July, 1937, for the purpose of using it as part of their head office. They have been located at 401 California Street since 1867.

Renovation of both buildings began in the spring of 1938. Among other modern devices installed is the second largest tube system for inter-department communication in the United States. Largest is in the Bureau of Printing and Engraving at Washington, D. C. A package of mail, three inches deep and twelve inches wide, can be fed into the tube at one time.

Space now occupied at both addresses amounts to more than 73,000 square feet of floor space. Nearly 150,000 feet (28 miles) of wire was used to install the intricate and modern inter-office and outside telephone and teletype systems.

Part of the mezzanine floor at 433 California Street is being made over nto comfortable reception headquarters for friends and agents of he company who visit the Exposiion during 1939. Modern elevators and new office equipment have been nstalled in this building.

G. E. PROMOTES COAST EXECUTIVES

R. M. Alvord and **A. S. Moody** were appointed commercial vice presidents of the General Electric Company at a meeting of the board of directors, it was announced reently.

R. M. Alvord.

Mr. Alvord is manager of General Electric's Pacific District, conisting of California, Arizona and Western Nevada. Graduated from owa State College in 1904 with the degree of Bachelor of Science in electrical engineering, he immediately entered the G. E. test course at Schenectady and in 1906 was ransferred to San Francisco as a alesman. He became manager of he supply department there, then manager of the San Francisco disrict office, and in 1936 manager of the newly created Pacific District.

Mr. Moody has been manager of the Northwest District of the company since 1936, prior to which he was manager of the Northwestern territory. He was graduated from the University of California in 1906 with the degree of Bachelor of Science in electrical engineering and started work as a salesman in the San Francisco office of the Stanley G. I. Company the same year. In 1907 he went with the supply department of the General Electric Company at its San Francisco office and the following year transferred to the Seattle office. In 1910 he was made manager of the supply department at the Portland office and in 1913 became assistant manager there. In 1923 he was appointed manager of the Los Angeles office and in 1924 manager of the Northwestern territory.

A. S. Moody.

A NEW LINE OF CLEAR FINISHES

A new line of clear finishes for industrial use is announced by the Finishes Division of E. I. duPont de Nemours & Company. The development represents another step in the expansion of the methacrylate resins into the finishes field.

Unlike the older type finishes, those of a methacrylate base afford unusual adhesion and flexibility over bare, non-ferrous metals such as aluminum, chromium and brass. They deposit a glossy, water-white film which dries rapidly by evaporation. The coating is hard and non-yellowing, resistant to acids, alkalis and alcohol. It has demonstrated satisfactory durability under outdoor exposure.

The new finish may be applied by any of the usual methods, such as brush, spray or dip. It has been designated as the RC-900 line.

TILDEN JOINS DODWELL

Augustus Tilden, traffic management expert and former agent for the Keene Line, has joined Dodwell and Co. Ltd. as a freight agent in the central California division, working out of San Francisco. Dodwell and Co. Ltd. are general agents at San Francisco for the Blue Funnel Line, the Barber Line, and the Fruit Express Line.

Mr. Tilden's many friends in San Francisco wish him the best of success in his new connection.

HOSE MASK APPROVED

The model BLS fresh-air hose mask, made by the Davis Emergency Equipment Co., New York, has been approved as a safety device by the Bureau of Marine Inspection and Navigation.

This type of respirator consists of a rubber face piece supplied with air by a hand-operated blower through a 1-inch hose of a length not to exceed 150 feet. It furnishes respiratory protection for workers entering atmospheres that are deficient in oxygen or that contain high concentrations of any noxious gases encountered on shipboard, except hydrocyanic acid, which poisons by skin contact in concentrations above 1 per cent.

Several features of this equipment, which adapt it especially for use in ships' tanks and holds, are now available in the marine field for the first time, according to the manufacturer.

On the Ways -

SHIPS IN THE MAKING

LATEST NEWS FROM AMERICAN SHIPYARDS

Bethlehem Launches Union Oil Tanker

An important addition was made to the fleet of modern American tankers when S.S. L. P. St. Clair was launched December 10 at the Sparrows Point yard of Bethlehem Steel Company. This vessel, a new unit for the fleet of Union Oil Company of California, will be used in regular service on the Pacific Coast. She was named for the present chairman of Union Oil and sponsored by his wife.

L. P. St. Clair has a deadweight of about 13,000 tons and a tank capacity of 103,514 barrels, or 4,347,500 gallons, of oil. The cargo space is divided into 24 tanks, allowing many grades of oil to be carried simultaneously. Pumping capacity is designed to load or unload the vessel in less than 12 hours.

Her principal dimensions are:

Length overall	463 feet
Molded beam	64 feet
Molded depth	34 feet 10 in.
Draft	28 feet 6 in.
Speed	13 knots

Propelling machinery consists of a single screw installation of Bethlehem built cross compound steam turbines, developing 3500 shaft horsepower and driving the shaft through Falk double reduction gearing. Steam will be supplied by two Foster Wheeler D type water tube oil burning boilers. The ship is fitted with a Contrarudder to augment the propulsive effect of the screw.

● Sun Rushing Tanker Construction

On January 7 the Sun Shipbuilding & Dry Dock Company of Chester, Pa., launched the first of three large, fast tankers building for the joint program of U. S. Maritime Commission and Standard Oil Company of New Jersey. This ship was christened Cimarron by Mrs. William D. Leahy, wife of the Chief of Operations, U. S. Navy. The Cimarron has been sold by the Maritime Commission to the U. S. Navy and will be delivered early in February.

Another of these large tankers will be ready for launching in March and will be delivered early in April. It also has been sold to the Navy. These vessels are 525 feet long, 75 feet beam, 39 feet depth, of 16,300 deadweight tons capacity, and powered for a sea speed of 16½ knots.

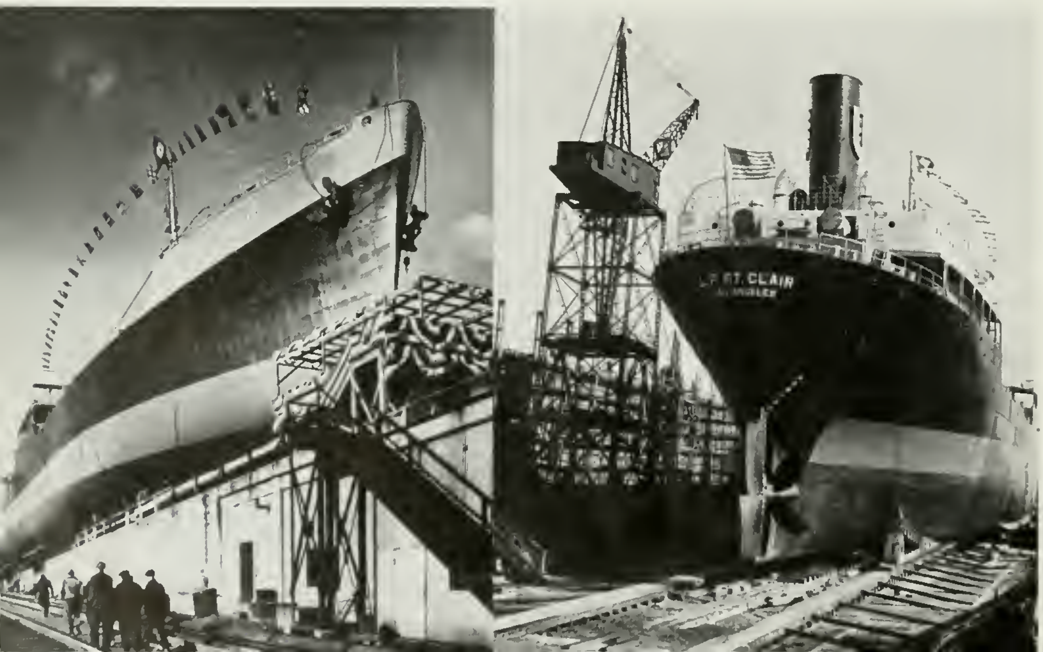
The Sun Yard reports contract from U. S. Maritime Commission for building four C-3 design diesel drive single screw cargo carriers. Each of these four ships is to have Busch Sulzer diesels of 8500 brake horsepower with a propeller speed of 95 r.p.m. The engine arrangement will probably be similar to that on the C-2 motorships, namely, 2 engines, each of 4250 B.H.P. and each driving a pinion meshed to a gear wheel on the propeller shaft. If our memory serves, these will be the highest powered American motorships.

● Moore Dry Dock Yard Active

In preparing for keel laying of the two C-3 cargo vessels which the Moore Dry Dock Company is building for the U. S. Maritime Commission, a survey revealed that the pile foundations for the ways were all in good sound condition below low water tide levels. This firm is therefore cutting the piles off at the top of the sound portion and joining the piles together with reinforced concrete girders to form practically permanent ways.

In the meantime work is progressing rapidly on the two steel lighthouse tenders, one of which is being built on one of the marine railway cradles.

It is estimated that keel for one of the C-3 ships will be laid in March, and for the other shortly thereafter.



Bow and stern views of tanker L. P. St. Clair just before launching.

SHIPBUILDERS and ENGINEERS

BUILDING WAYS FOR WOOD AND STEEL CONSTRUCTION

Three Plants

OAKLAND PLANT
Dry Dock and Machine Shop
Dry Dock cap.: 12,500 tons
Length 450 feet
FOOT OF FIFTH AVENUE
Tel.: GLencourt 3922

SAN FRANCISCO OFFICE AND PLANT
Machine Shop
and
General Repairs
1100 SANSOME STREET
Tel.: SUtter 0221

ALAMEDA PLANT
Two Dry Docks
3,000 tons and 5,000 tons
capacity
FOOT OF SCHILLER STREET
Tel.: ALameda 0533

GENERAL ENGINEERING and DRY DOCK COMPANY

• Western Boat Busy

The Western Boat Building Co., Tacoma, Wash., launched their Hull No. 133 on December 1 and will complete the job early in February. This is a wooden purse seine fishing boat of their well-known type, 80 feet long, 20 feet beam, and 10 feet deep, powered with a 200 shaft horsepower Atlas diesel engine.

They have on the ways two other hulls:

No. 134, a wooden tuna clipper type fishing boat 90′ x 24′ x 13′, to be launched February 15; and

No. 135, a small wooden diesel ferryboat.

• Levingston Specializes in Welded Steel Hulls

The Levingston Shipbuilding Co., Orange, Texas, are doing a very nice business in all welded steel hulls for various uses.

In January they delivered an oil barge 165′ x 36′ x 9′ 9″ to the Edwards Transportation Company of Houston, Texas.

For February delivery they have an oil barge 173′ x 39′ x 8′ 6″ for the Hillman Towing Co., Orange, Texas; and a 10″ hydraulic dredge, diesel-electric drive, for J. G. McMullen, Orange, Texas.

For March delivery an 80′ x 22′ x 9′ 6″ tug powered with a 550 H.P. Cooper Bessemer diesel engine goes to W. G. Coyle & Co., New Orleans, La.; and a boiler barge 84′ x 28′ x 7′ to the Sun Oil Co., Beaumont, Texas.

• Staten Island Beats Schedule on Keels

The Staten Island Yard of the Shipbuilding Division of the Bethlehem Steel Company Inc., laid keels in December for the three Navy fleet tugs that were scheduled for January. Keel for Hull No. 8001, to be named Navajo, was laid on December 12; that for Hull No. 8002, to be named Seminole, was laid December 16; and that for Hull No. 8003, to be named Cherokee, was laid December 23.

• Dravo Building 45 Hulls

The Dravo Corporation report forty-five steel hulls under construction as of January 1, 1939. Thirty-five of these are standard barges and workboats for stock account. Nine are ash removal barges for the Department of Sanitation, City of New York; and one is a 25-ton floating crane for the Bureau of Yards and Docks, U. S. Navy Department.

• Two Destroyers in One Day

The Federal Shipbuilding and Dry Dock Company of Kearny, N. J., report that on February 4 the two destroyers DD411 and DD412 will both be launched and christened respectively Anderson and Hammann. Keels for two more destroyers of same type will be laid promptly on the vacated ways.

• Navy Orders for Todd and Foster

Four of the U. S. Navy's newest destroyers, now under construction, are to be equipped with Todd "Hex-Press" double front type Air Registers and "Hex-Press" Variable Capacity Mechanical Pressure Atomizing (Navy Type) Burners.

Each of these destroyers is fitted with Foster Wheeler Corporation Water Tube boilers, four to each vessel.

It often pays to decelerate promptly.

The Deceleration, and Intermittent of

By D. W. DICKIE

I. Deceleration

Notwithstanding the voluminous bibliography pertinent to the subject matter of these three papers there seems to be no concise method given for calculating the deceleration and acceleration of ships and it must be confessed that one has to have had the experience of calculating and subjecting the figures to actual trial about a dozen times before the knack is acquired of getting trustworthy results.

Horsepower

The principal stumbling block in the early work on the problem was the determination of the power to be used in the formulas.

Due to the illness of a superintending engineer the writer was called upon to look after the repairs on a wooden "steam schooner" that had struck the bar leaving a lumber port. The propeller, among other things, was lost and there was no record available to work from. A new propeller was designed, the repairs completed satisfactorily and the ship proceeded to sea. The captain reported that he was consistently overrunning his courses and the superintending engineer asked for an explanation. We visited a sister ship on the dock and the only explanation that could be found was either a difference in the fairway pieces or else the faster ship had them fitted originally and the slower ship which had been repaired did not. The increase in speed was calculated from the log and amounted to 1½ knots. The fairway pieces are pieces of wood fastened to the after side of the sternpost and the forward side of the rudderpost in wooden vessels. These pieces are then faired off similar to the contra-propeller idea and have been in use for at least 30 years.

The above incident served its purpose and caused the substitution in the formulas of calculated horsepower for the actual indicated horsepower. At first a speed and horsepower scale copyrighted in 1894 by A. M. Gordon, M.I.N.A., was used

VALUES OF THE FACTOR "M" IN THE "DISTANCE" FORMULA
FOR DECELERATION AND ACCELERATION $L = \frac{D}{Mr}$

	DECELERATION						ACCELERATION
POWER REVERSING	100%	2/3	53%	40%	32%	22%	100%
L_1	92 79	70 19	60 67	51 35	45.39	37 55	INFINITY
$L_{31/32}$							23 07
$L_{15/16}$							30.47
$L_{7/8}$	113 14	84 11	71 96	60 14	52.65	42.89	44 33
$L_{3/4}$	144 12	105.13	88 92	73 25	63 40	50 69	77 80
$L_{5/8}$	195 05	139 47	116 48	94 40	80 62	63 01	129 85
$L_{1/2}$	288.24	201.97	166.45	132.48	111.41	84 73	223 58
$L_{3/8}$	488 83	336.05	273 31	213.50	176 57	130.15	424 41
$L_{1/4}$	1060.94	717.75	576 99	443.02	360.52	257 22	996.60
$L_{1/8}$	4148 49	2776.36	2213 70	1678 53	1349 16	937 41	4084 12

VALUES OF THE FACTOR "K" IN THE "TIME" FORMULA
FOR DECELERATION AND ACCELERATION $T = \frac{D}{K r V_1}$

	DECELERATION						ACCELERATION
POWER REVERSING	100%	2/3	53%	40%	32%	22%	100%
T_1	40 95	29 63	24 87	20 20	17 23	13 32	INFINITY
$T_{31/32}$							15 52
$T_{15/16}$							18.73
$T_{7/8}$	44 74	32 02	26.70	21.52	18.25	13 98	23.75
$T_{3/4}$	49 97	35 34	29 26	23 37	19 68	14 91	33 05
$T_{5/8}$	57 57	40 19	33 00	26 09	21 78	16 27	43 86
$T_{1/2}$	69 36	47 79	38 90	30 40	25 13	18.46	58.55
$T_{3/8}$	89 64	60.99	49 22	38 00	31 08	22 37	81.58
$T_{1/4}$	131 27	88 38	70 78	54.00	43 72	30 80	125 91
$T_{1/8}$	258 60	172 85	137 69	104 24	83 65	57 92	255 93

Sheet I.

Acceleration Deceleration Ships.

to get the horsepower required to drive the ship at the speed given by the log. In 1907 the Morton and Goudie Speed and Horsepower Computer was purchased, which proved much more satisfactory and eliminated the errors caused by the previous scale.

When we realize that it would have required a 90 per cent increase in power to increase the speed of the ship mentioned from 8 to 9½ knots it is obvious that the horsepower of her engine had no bearing on this problem.

Wave Formation

It was noticed that when the engine of a ship was reversed there was a sharp reduction in speed caused by the return of the wave making energy to the ship as the wave formation subsided. The speed immediately subsequent to the reversal of the engines seems to be almost exactly 77 per cent of the speed previous thereto. Where a ship is proceeding under a "Slow" bell and an order is given of less magnitude, such as "Stop" or "Reverse," the speed is likewise reduced to about 77 per cent of the previous speed.

Reversal of the Engine

Considerable difference in time of reversal is prevalent with different ships and ship's officers. It varies from 6 seconds up to 29 seconds to put the engine in reverse, but generally speaking, where an emergency reversal order is given—that is, the telegraph is rung twice in rapid succession — there are very few occasions where a longer time than 6 seconds is required, and under normal conditions 7 to 8 seconds is about correct. In reversing large turbines, say 19,000 horsepower, the reversal time is about double the above figures.

Where a vessel is fully loaded it has been found that plotting the curves by using the horsepower for a speed about ¼ of a knot higher than the actual speed gives a result more in keeping with the deceleration of the ship and makes allowance for the initial deceleration and the time for reversal of the engine.

Lower End of the Curve

The lower end of the curve is the part that is of most value for collision determinations. There is a noticeable slight departure of the plotted performance from the theoretical near the zero speed part of the curve which resembles the well known hump of a horsepower curve for a vessel in shallow water. It is ascribed to a combination of a possible small hump in the horsepower curve at low speeds and the effect of loose oil fuel and water running toward the bow of the ship as a result of the retarding influence of the propeller.

Wind

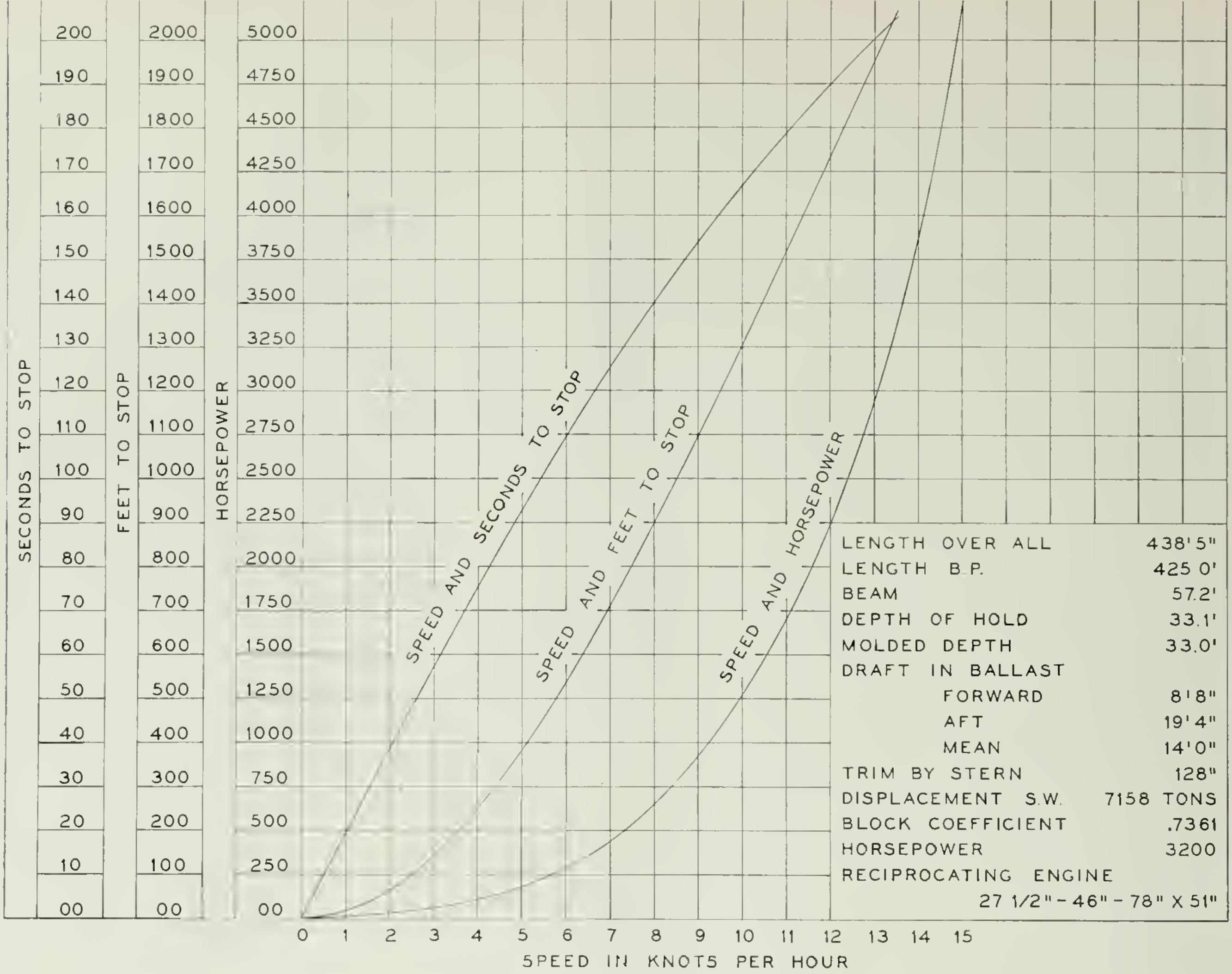
Both time and distance required for deceleration are affected by wind conditions, but no rule for the necessary allowance can be laid down at this time. Generally speaking there is little or no wind when there is fog, while the tests have to be made on a clear day when it is almost certain there is some wind. For that reason the deceleration and acceleration tests are usually made with the wind abeam.

Tests

The best way to make the test is by using boxes or cartons about 2 feet cube, throwing them overboard at intervals as described under the test given in the section on Intermittent Deceleration. All errors are eliminated except that due to wind. In making the turning test by this method it is necessary to station one of the ship's deck officers on the bridge at the ship's side with a sextant. He uses the distance from the water to his eye as the base of the triangle—the angle between the water and the vertical line is 90 degrees—and the angle between the line of the ship's side and the line from his eye to the box completes the triangle. This gives the distance of the ship from the few initial boxes after having completed the turn through 360 degrees. As the ship turns in a gradually reducing spiral the boxes should be used on the opposite side from the center of the figure described in making the turn.

Where a floating buoy is used it is necessary to have two alidades on the ship a set distance apart. The set distance serves as the base of the triangle and a simultaneous sight on the buoy with each alidade gives the two necessary angles. In making a turning circle it is necessary to take simultaneous readings on the standard gyro compass to complete the figure.

Where a fixed buoy is used it is necessary to run all the tests both ways to make the current correction. In making the turning circle diagram an approximation of the current correction is obtained by proceeding twice around the circular figure.



Sheet II.

Where the transit method is used by stationing two men on shore, the distance between them forms the base of the triangle and the two angular sights on the ship complete the triangle. Here again duplicate readings of a floating object must be taken to get the current correction. Observers at intervals on the shore note the time that the floating object passes a line at right angles to the flow of the current.

To show how the foregoing is applied practically, take the case of a vessel:

Length overall	438′ 5″
Length between perpendiculars	425′ 0″
Beam	57.2′
Depth of hold	33.1′
Molded depth	33′ 0″
Draft in ballast forward	8′ 8″
Draft in ballast aft	19′ 4″
Draft in ballast mean	14′ 0″
Trim by the stern	128″
Displacement in salt water	7158 tons
Block coefficient	.7361
Indicated horsepower	3200

Reciprocating steam engine
27½″ - 46″ - 78″ x 51″ stroke

In the case of a reciprocating steam engine the horsepower is assumed to be the same turning in either direction, and in using the Morton and Goudie Speed and Power Computer the results are based on this type of engine.

Due to the lower mechanical efficiency on diesel engines we have to add 15 per cent to the power given by the Power Computer to get the necessary rating of a diesel engine to make the same speed as with a steam reciprocating engine. In certain cases the vessels seem to make the speed using turbines rated at 82 per cent of the power given by the Computer, largely due to the fact that the computer is indicated horsepower while the rating of the turbine is shaft horsepower.

The power and the speed should be carefully checked to make certain they have been correctly related to each other.

Turbines are often arranged to have less power reversing than going ahead and the percentages given in the table, sheet 1, are those observed by the writer.

The reason that the builder's trials cannot be used in specific instances is that the ship is very seldom loaded to the draft of the official trial at the time of the collision but it is always wise to make a se of calculations at the trial draft t see if the rules given are applicabl if the ship was loaded to trial draf

- **Squat**

Where the ship is operating i shallow water a set of curves has t be made for the ship in deep water and subsequently made again for th changes required by shallow wate conditions.

From Morton and Gouldie's Spee and Power Computer the limitin speed is 13.03 knots.

Required Speed	Ratio	Horsepowe
7	.531	435
8	.608	650
9	.686	921
10	.760	1260
11	.840	1710
12	.913	2210
13	.992	2930
14	1.066	3850
15	1.145	5210

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Strength
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Plotting the results given by the Power Computer on sheet 2, the speed corresponding to 3200 horsepower is found to be 13.34 knots. The vessel actually will not make this speed because the propeller is designed to absorb 3200 horsepower with the ship fully loaded and the pitch is too low to produce the speed obtainable with the smaller draft and displacement.

However, the power is available to bring the ship to rest from the speed she will make with the propeller she has. In this case the vessel was run on the measured mile and made a speed of 11.59 knots, turning 71.48 r.p.m., and 12.62 knots, turning 78.18 r.p.m. The speed just before the turning and decelerating trials was 11.44 knots, turning 72 r.p.m.

We have therefore 3200 horsepower, 13.34 knots and a displacement of 7158 tons.

$$\frac{\overset{\text{feet}}{6080} \times \overset{\text{knots}}{13.34}}{\underset{\text{min.}}{60} \times \underset{\text{sec.}}{60}} = 22.53 \text{ feet per second } V_1$$

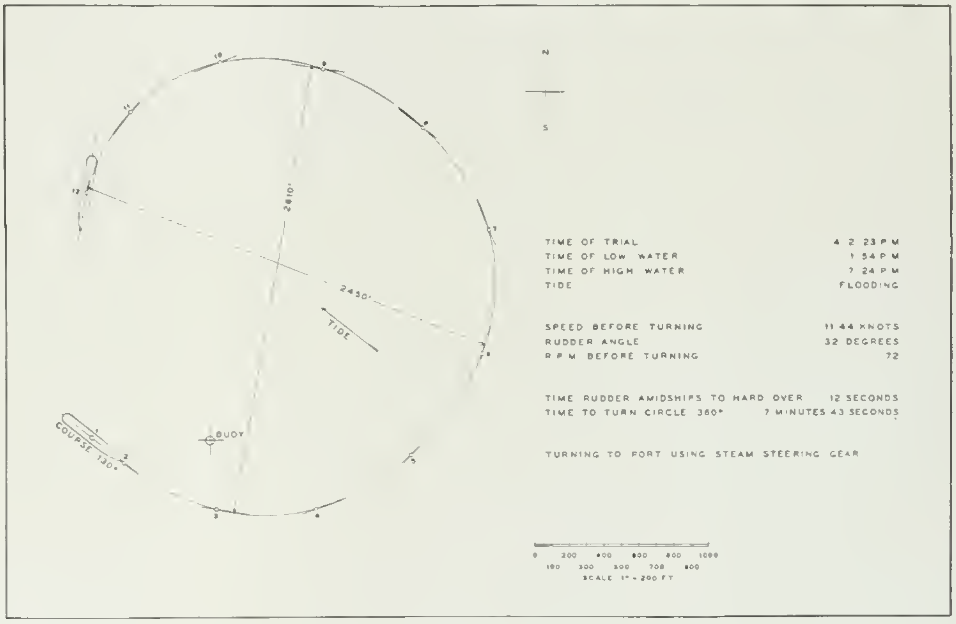
$$\frac{\overset{\text{Horsepower}}{3200} \times \overset{\text{ft. lb. per sec.}}{550}}{22.53 \quad V_1} \times 55.5\% = 43355.96 \text{ lbs. thrust} = R$$

55.5 per cent is the efficiency of the propeller backing.

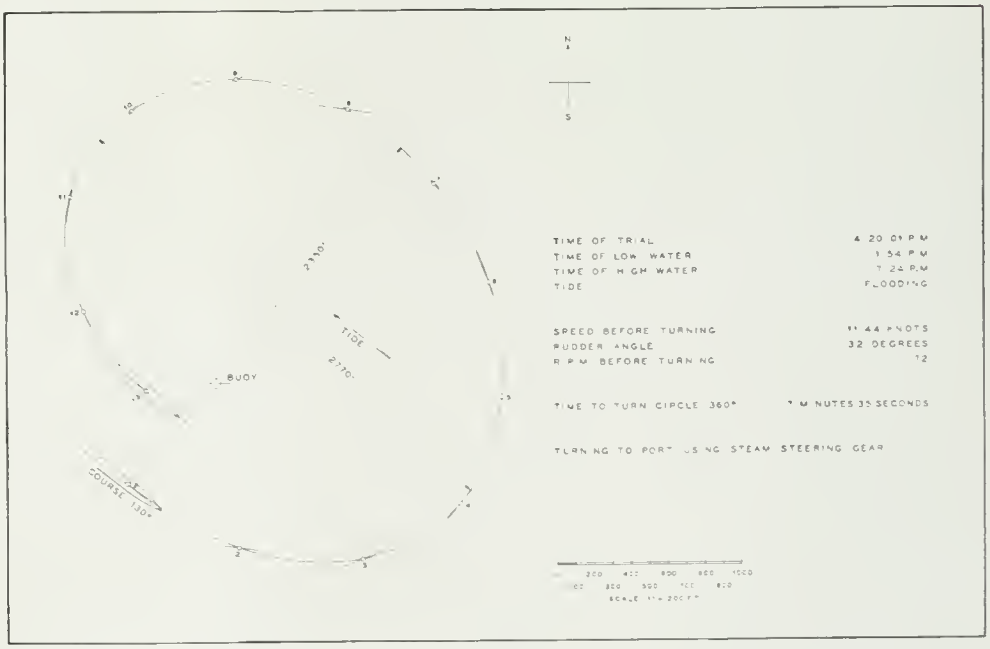
$$r = \frac{R}{V_1} = \frac{43355.96}{(22.53)^2} = 85.4152 = r$$

Displacement 7158 tons or 16,033,920 pounds.

To simplify the work take out the permanent numbers.


N
S
2810'
2450'
TIDE
BUOY
COURSE 130°
TIME OF TRIAL 4 2 23 P M
TIME OF LOW WATER 1 54 P M
TIME OF HIGH WATER 7 24 P M
TIDE FLOODING
SPEED BEFORE TURNING 11 44 KNOTS
RUDDER ANGLE 32 DEGREES
R P M BEFORE TURNING 72
TIME RUDDER AMIDSHIPS TO HARD OVER 12 SECONDS
TIME TO TURN CIRCLE 360° 7 MINUTES 43 SECONDS
TURNING TO PORT USING STEAM STEERING GEAR
0 200 400 600 800 1000
100 300 500 700 900
SCALE 1" = 200 FT

Sheet III.


N
S
2330'
TIDE
2770'
BUOY
COURSE 130°
TIME OF TRIAL 4 20 01 P M
TIME OF LOW WATER 1 54 P M
TIME OF HIGH WATER 7 24 P.M
TIDE FLOODING
SPEED BEFORE TURNING 11 44 KNOTS
RUDDER ANGLE 32 DEGREES
R P M BEFORE TURNING 72
TIME TO TURN CIRCLE 360° 7 MINUTES 35 SECONDS
TURNING TO PORT USING STEAM STEERING GEAR
SCALE 1" = 200 FT

Sheet IV.

Marine Insurance in All Phases — "All Risks" . . . Inland Marine . . . Ocean Marine

STANDARD MARINE INSURANCE COMPANY, LIMITED
NATIONAL UNION FIRE INSURANCE COMPANY
MERCANTILE INSURANCE COMPANY OF AMERICA

GEO. E. BILLINGS CO.

Pacific Coast General Agents—Richard J. Lutich, Marine Manager

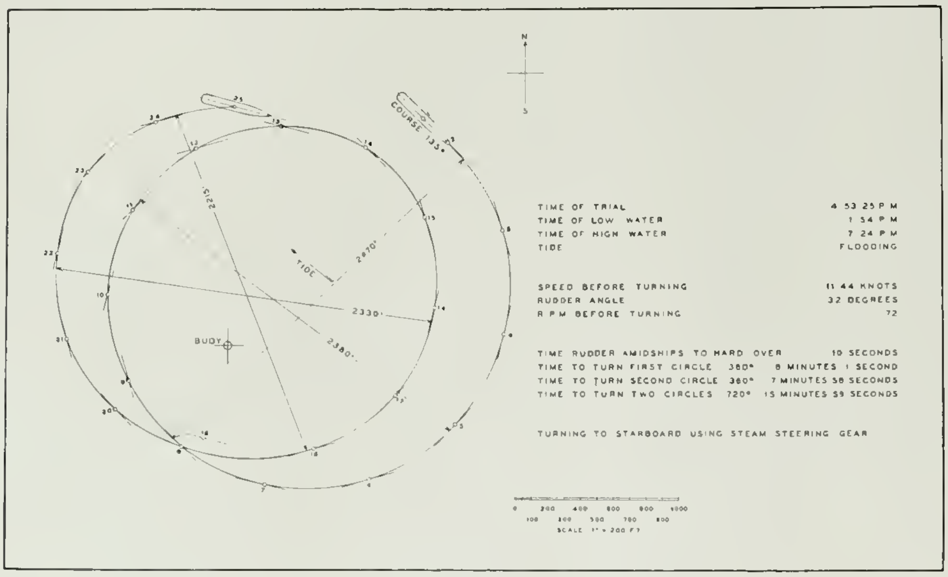
GArfield 3646
308 California St.
SAN FRANCISCO

TRinity 1521
Spreckels Bldg.
LOS ANGELES

SEneca 1478
Colman Bldg.
SEATTLE

MARINE DEPARTMENT
AETNA INSURANCE CO.
QUEEN INSURANCE CO.
MARITIME INSURANCE CO., LTD.
FIDELITY PHENIX FIRE INS. CO.
Commercial Hull Dept.
AUTOMOBILE INS. CO.

MATHEWS & LIVINGSTON
Marine Underwriters
200 BUSH ST. SAN FRANCISCO
Offices at: Colman Bldg. - Seattle 111 West 7th St. - Los Angeles


N
S
COURSE 135°
TIDE
BUOY
2330'
2380'
2870'
2122'
TIME OF TRIAL 4 53 25 P M
TIME OF LOW WATER 1 54 P M
TIME OF HIGH WATER 7 24 P M
TIDE FLOODING
SPEED BEFORE TURNING 11 44 KNOTS
RUDDER ANGLE 32 DEGREES
R P M BEFORE TURNING 72
TIME RUDDER AMIDSHIPS TO HARD OVER 10 SECONDS
TIME TO TURN FIRST CIRCLE 360° 8 MINUTES 1 SECOND
TIME TO TURN SECOND CIRCLE 360° 7 MINUTES 58 SECONDS
TIME TO TURN TWO CIRCLES 720° 15 MINUTES 59 SECONDS
TURNING TO STARBOARD USING STEAM STEERING GEAR
0 200 400 600 800 1000
100 300 500 700 900
SCALE 1" = 200 FT

Sheet 5.

$$\frac{D}{r} = \frac{16033920}{85.4152} = 18771.75$$

$$\frac{D}{rV_1} = \frac{16033020}{85.4152 \times 22.53} = 8331.97$$

Introducing the factors "M" and "K" from the table on sheet 1, we get

Speed	Knots	Feet to stop	Time	Seconds to stop
L_1	13.34	2024	T_1	203.4
$L_{7/8}$	11.6725	1600	$T_{7/8}$	186.2
$L_{3/4}$	10.005	1303	$T_{3/4}$	166.8
$L_{5/8}$	8.3375	962.4	$T_{5/8}$	144.8
$L_{1/2}$	6.67	651.5	$T_{1/2}$	120.2
$L_{3/8}$	5.0025	384.2	$T_{3/8}$	92.93
$L_{1/4}$	3.335	177.0	$T_{1/4}$	63.48
$L_{1/8}$	1.6675	45.51	$T_{1/8}$	32.22

The results are plotted on sheet 2.

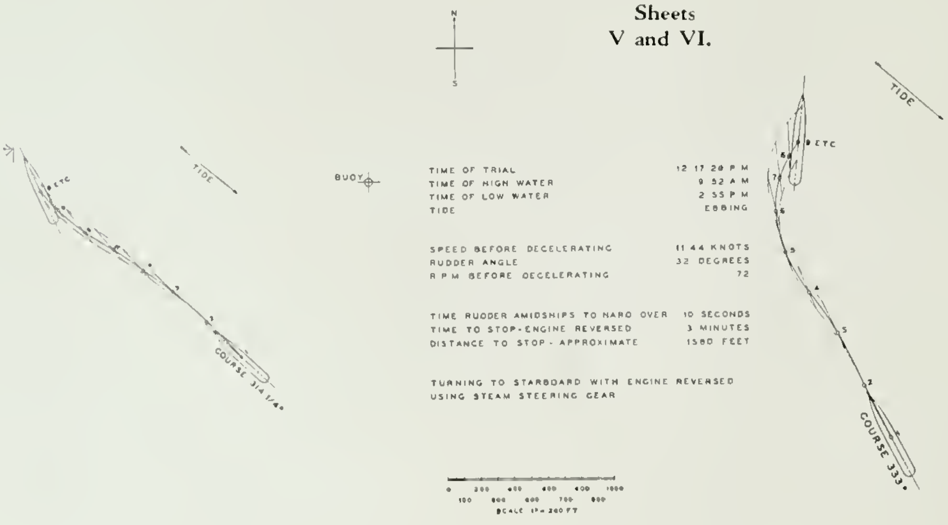
The technical staff of the shipowner ran an experimental test on the vessel about one month after the calculations were made and the results are shown on sheets 3 to 7.

At 11.44 knots the calculations show that the vessel will stop in 1610 feet and 183.7 seconds (sheet 2).

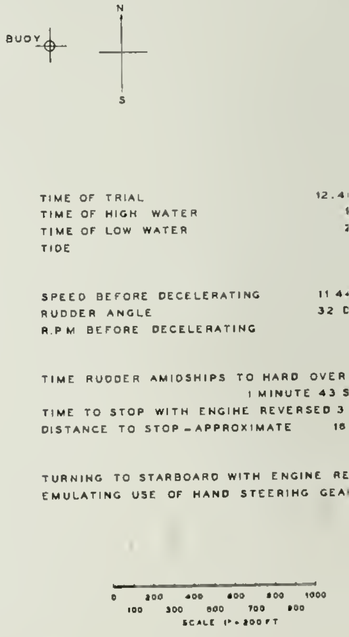
The test that most closely approximates the basic premise of the calculations is the one where the rudder was put over in one minute 43 seconds, emulating the use of the hand steering gear. The distance traveled was 1620 feet and the time was 3 minutes, or 180 seconds. See sheet 7.

Putting the rudder hard over should affect the time and the distance, but it was conceded that the calculated and observed time and distance agreed closely enough for practical purposes.

(Several of the sheets used in this section are pertinent to Sections 2 and 3.)


N
S
TIDE
BUOY
ETC
COURSE 314 1/4°
TIME OF TRIAL 12 17 20 P M
TIME OF HIGH WATER 9 52 A M
TIME OF LOW WATER 2 55 P M
TIDE EBBING
SPEED BEFORE DECELERATING 11 44 KNOTS
RUDDER ANGLE 32 DEGREES
R P M BEFORE DECELERATING 72
TIME RUDDER AMIDSHIPS TO HARD OVER 10 SECONDS
TIME TO STOP-ENGINE REVERSED 3 MINUTES
DISTANCE TO STOP - APPROXIMATE 1580 FEET
TURNING TO STARBOARD WITH ENGINE REVERSED USING STEAM STEERING GEAR
0 200 400 600 800 1000
100 300 500 700 900
SCALE 1" = 200 FT
TIDE
ETC
COURSE 333°

Sheets
V and VI.


BUOY
N
S
TIME OF TRIAL
TIME OF HIGH WATER
TIME OF LOW WATER
TIDE
SPEED BEFORE DECELERATING
RUDDER ANGLE
R.P.M BEFORE DECELERATING
TIME RUDDER AMIDSHIPS TO HARD OVER
1 MINUTE 43 S
TIME TO STOP WITH ENGIHE REVERSED 3
DISTANCE TO STOP — APPROXIMATE
TURNING TO STARBOARD WITH ENGINE RE
EMULATING USE OF HAND STEERIHG GEA
12.4
11 4
32 D
0 200 400 600 800 1000
100 300 500 700 900
SCALE 1" = 200 FT

Running Lights of Pacific Shipping

HUGH A. MACKENZIE

OSCAR G. STEEN

CHARLES G. COX

Hugh A. Mackenzie, vice presi lent in charge of Passenger Traffic, merican President Lines. A life ime student of coastwise and off hore passenger service, he has had mportant posts with Pacific Coast Steamship Company (the original dmiral Line), with Great Northern nd Northern Pacific Steamship . . . oining Dollar Line at the time the ound-the-world service was estab ished (1923). Hugh Mackenzie ives in San Francisco; he is mar ied, plays a little golf, considerable ridge. His principal hobby . . . unting! His quarry ranges from lucks to Alaskan big game. Enters nnual shooting contests and usu lly comes out first or runner-up.

At present in New York with Joseph R. Sheehan, A. P. L. presi lent, and will return to Coast head quarters during early February.

Oscar G. Steen, vice-president in charge of the Orient . . . for American President Lines . . . with the former Dollar organization since the days of its esteemed founder. For years, headquartered in the Robert Dollar Building in Shanghai.

His duties throughout the Asiatic seaboard have won him countless friends in shipping-transportation circles. Returned to his post on December 31 with the San Francisco sailing of the President Pierce, the first American passenger vessel to call at Shanghai on regular schedule since suspension of service almost two years ago. While awaiting the time when the Sino-Japanese war conditions would permit restoration of shipping and passenger services, Mr. Steen has been headquartered in San Francisco. His business card . . . English on one side . . . Chinese on the reverse.

Charles G. Cox, General Manager of Enterprise Engine Company, San Francisco. Started as Sales Manager in May, 1934. Graduate of Mechanical Engineering, University of California in 1928. He started diesel engine activity as Oiler on M. S. Kennecott, the first large American Motorship, and served in various capacities in engine rooms on motorships and steamers of American-Hawaiian, Matson, General Petro, and Alaska Steamship Company, and finally as Chief Engineer on M. S. Crown City, Roosevelt Line, New York.

Marine Engineer and Sales Manager of Ray Burner Company from 1929 to 1934. He was appointed to his present position after the death of Frank Gilmore in a plane wreck two years ago. Follows Gordon Cox (his father), long time district manager for McIntosh-Seymour Diesel Engine Company in San Francisco.

Propeller Club of California

News of the Month

The annual meeting and election of officers was on the schedule for the January 10th meeting of the Propeller Club of California. The unanimous choice of the members has placed these officers in charge of the good ship for her 1939 voyage:

President, **C. E. Finney.**

Vice Pres., **Herman D. Nichols.**

Directors, **Winslow D. Conn, Arthur Donnelly, Richard Glissman, Eugene V. Winters.**

Retiring President **C. M. LeCount** paid fitting tribute to the committees who functioned so capably during his term. **Fletcher Monson,** who headed the Program Committee, came in for special commendation; Secretary **Stanley Allen,** likewise.

These Governors whose 3-year terms have now concluded were also thanked for their faithful work:

Harding Brann
Bernard DeRochie
George E. Swett.

The gavel was turned over to President-elect Finney who gave a brief talk on his plans for the year and invoked the cooperation of all members for a successful administration.

New Committee Appointed

First committee as set up by the incoming administration is that important one which functions on programs and luncheon-meetings.

E. J. ("Eddie") Macfarlan is Chairman. His aides are:

Howard Bernhard
Robert H. Christy
Bern DeRochie
M. Gilmore
R. H. Glissman
J. Lalor
Fletcher Monson
Howard Weule.

We Get Air-Minded

On January 24th the Club had the extreme pleasure of listening to Ernie Smith, the aviator who with Emory Bronte made the first civilian flight from the mainland to Hawaii.

Guest-speaker Smith held the interest of a big attendance with fascinating accounts of this record flight and his subsequent air experiences. Particularly interesting were his comments on the safeguards and precautions which the transport lines now follow for fast and safe flying. His responses to the questions invited from his hearers gave good insight into the elaborate and thorough training of pilots.

Frank DePue acted as Chairman of the day. It was good to have Frank aboard!

SPERRY EMPLOYEES HONORED

Thirty-eight employees of the Sperry Gyroscope Company, Inc., having completed twenty years of service during the past year, were honor guests of the Sperry Employees' 15-Year Club at dinner January 12 at the Livingston, 309 Schermerhorn Street, Brooklyn, New York. **R. E. Gillmor,** president of the Sperry Gyroscope Company, presented a gold watch or a silver service to each of the honor guests.

The Sperry 15-Year Club now numbers two hundred and thirty employees, and of this number one hundred and forty-nine have completed twenty or more years with the company.

Frederick Fromme, foreman of the tool room and president of the club, presided at the dinner. **George S. Lambert,** customer order supervisor, was chairman of the entertainment committee.

BETHLEHEM AT TREASURE ISLAND

The services that steel perform in modern living will be the mai theme of Bethlehem Steel Company's exhibit at the Golden Gat International Exposition. The Bethlehem exhibit will be located in th Vacation Land Building, which wi also house important exhibits b some of the steel industry's best customers, such as railroads, the automobile industry and the shippin industry.

A section of the exhibit devote to Bethlehem Steel Company' Shipbuilding Division will show b a series of illuminated transparencies how a ship is built, carryin the story from the taking of th dimensions from the scale model an laying the keel to the launching Another section of this exhibit wil consist of a large electric book, th pages of which will slowly tur showing representative types o ships that have recently been buil by Bethlehem.

Emphasis is thrown on uses o steel, also, by depiction of man achievements in steel constructio that Bethlehem's Fabricated Stee Construction Division has to its credit in the Pacific Coast district The central theme of this section o the exhibit is the Golden Gate Bridge, the steel work of which wa erected by Bethlehem.

A motion picture will show ste by step how raw materials are converted into steel and eventually int a steel girder, and thence carrying the story along to fabricating and erecting of the girder as one of the members in the towers and stee work of the Golden Gate Bridge.

A large mural that shows the everyday uses of steel in a representative community will be one of th features of the exhibit.

At a recent sailing our cameraman snaps these A.P.L. officials on the job! Recognize the third man from the left?

Newport News Purchasing Personnel

The Newport News Shipbuilding and Dry Dock Company announces the retirement of **James Plummer,** purchasing agent, after 48 years' service. The retirement will be effective at the expiration of an extended leave of absence which began January 1. **H. K. Peebles** has been appointed acting purchasing agent, with office at the plant at Newport News, Virginia. **J. M. Clawson,** assistant purchasing agent, will continue to be located at 90 Broad Street, New York, N. Y.

Donald Gay is assistant purchasing agent and material agent, with offices at Newport News, Virginia.

HAROLD A. LEE
Lately assistant general agent, New York, Harold A. Lee on October 1 succeeded William McIlroy, retired, as general agent of the Canadian Pacific at Los Angeles for the important Southern California territory. He joined the Canadian Pacific at Boston 25 years ago, later going to New York. He has traveled extensively in the service of his world-girdling transportation company, and is a widely experienced travel expert.

UNITED STATES LINES TO EXHIBIT

The United States Lines became the first American steamship company to engage exhibition space at the World's Fair in New York with the recent signing of a rental contract for space in the Marine Transportation Building, it was announced by **John M. Franklin,** president of the Lines.

The space selected is in the Marine Building, which is the first in any fair to be devoted exclusively to marine activities.

Irwin Scott, general superintendent of the Matson Line, left, and Hugh Gallagher, operations manager, assist two Exposition beauties hoist a mammoth pennant on the steamer Lurline prior to its departure for Hawaii. The company has announced that all Matson passenger liners will carry similar flags advertising the San Francisco Fair in ports of the South Pacific served by the line.

News of "The Bilge Club"

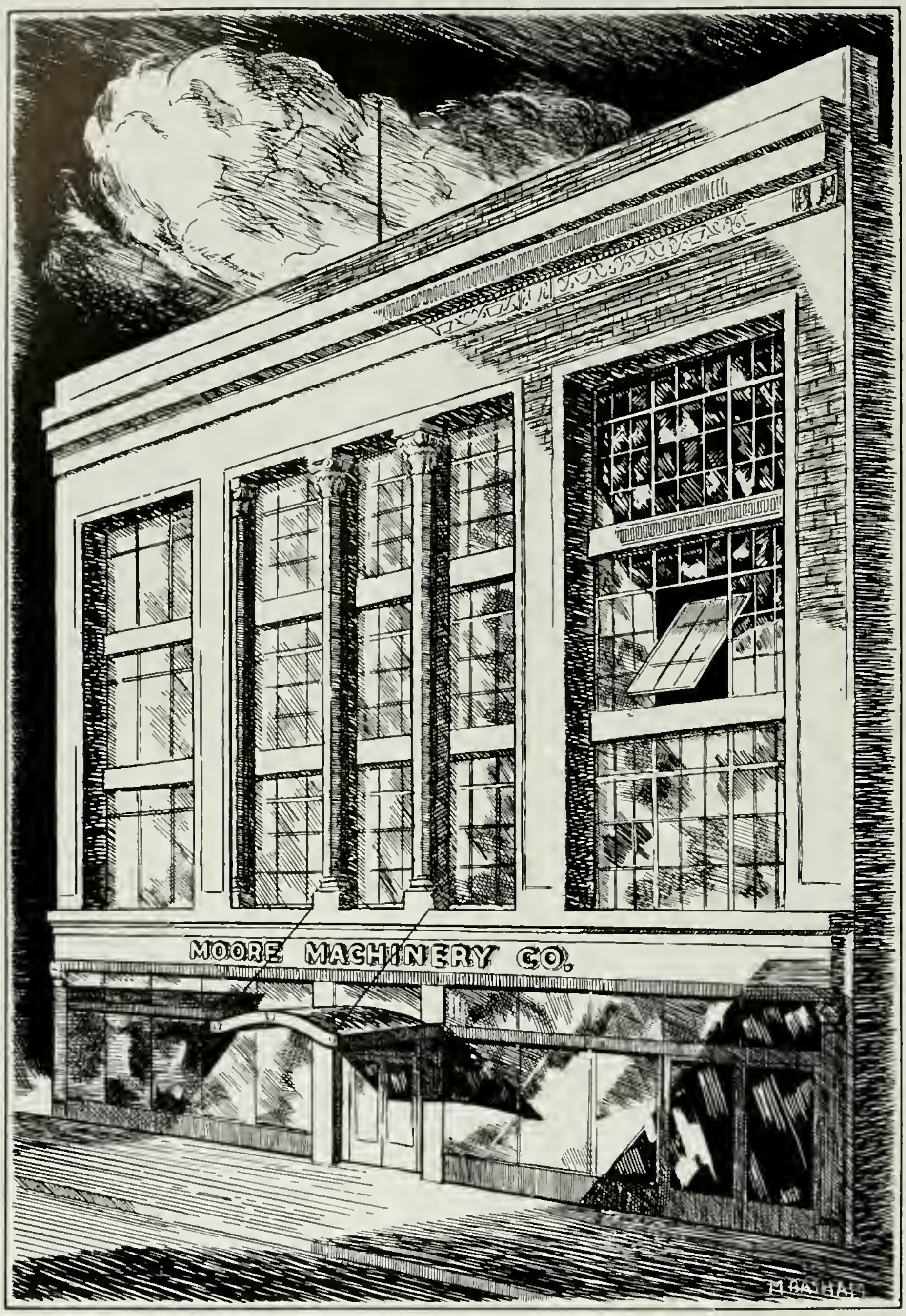
By William A. Mason

Lieut. Commander, U. S. Navy
(Retired)

The annual banquet of the Bilge Club is looming! This event which always attracts hundreds of maritimers from all Pacific Coast ports will be staged in the favorite locale . . . the Biltmore Hotel in Los Angeles. The big date is Saturday, February 25th.

The directors of the Club, San Pedro's shipping fraternity, have already had the organization meeting to chart the course and survey the plans. These Bilgers met at Club headquarters, the California Yacht Club at Wilmington, on Wednesday, January 11th, and launched preliminary plans for this eleventh annual banquet.

The committees for the affair were selected as follows: In charge of the General Committee is Arthur Pegg. Finance and secretarial details will be supervised by Jack Anderson and Lloyd Moore; decorations, Hampton Neergaard; reception, Tom Forster; attendance, Joe Lang; dinner and refreshments, Al Johnson; entertainment, Dan Dobler; announcements and program, Arthur Woll.


MOORE MACHINERY CO.

To the Shipbuilders and Marine Manufacturers of the Pacific Coast

1939 will be a shipbuilding year. You have weathered the discouraging two decades since the war-time boom and are approaching a peace-time activity which promises to restore West Coast shipbuilding to its former high place in the nation's regard. ¶ We are certain you will be impressed with the important part which machine tools play in shipbuilding and marine manufacture. That is where our organization can help you. Obsolete tools can find no place in your plans, your calculations, your contract fulfillments.

We suggest with all the earnestness at our command that you adopt a modernization program for replacing the money-consuming, time-consuming machines of yesterday with these products of America's pre-eminent machine tool builders.

- CHAS. G. ALLEN CO.
  - Allen Drilling Machines.
- BADGER STATE MACHINE WORKS
  - Combined power punches and shears, bending rolls, punches.
- BARBER-COLMAN CO.
  - Hobbing Machines, Hob Sharpening Machines, Milling Cutters, Hobs, Reamers.
- BARNES DRILL CO.
  - Self-Oiling All Geared Drilling Machines. Honing Machines.
- EDWIN E. BARTLETT CO.
  - Arbor Presses.
- C. C. BRADLEY & SON, INC.
  - Bradley Forging Hammers.
- BUFFALO FORGE CO.
  - Drills, Ventilating Equipment, Iron Workers.
- THE CARLTON MACHINE TOOL CO.
  - Carlton Radial Drills.
- CINCINNATI SHAPER CO.
  - Shapers, Press Brakes, and Squaring Shears.
- CHAMBERSBURG ENGINEERING CO.
  - Forging Hammers, Hydraulic Presses, Punches and Shears.
- CLEVELAND AUTOMATIC MACHINE CO.
  - Single-Spindle, Multiple Spindle, Automatic Screw Machines.
- CONSOLIDATED MACHINE TOOL CORP.
  - Betts, Betts-Bridgeford, Newton, Colburn, Hilles & Jones, Modern Equipment.
- DALRAE TOOL CO.
  - The Midgetmill, the Speedmill.
- FEDERAL MACHINE & WELDER CO.
  - Spot Welders, Butt Welders.
- FOX MACHINE CO.
  - Multiple Drilling Machines and Power Presses.
- GARDNER MACHINE CO.
  - Flat Surface Grinders, Disc and Ring Wheel Grinders.
- GIDDINGS & LEWIS MACHINE TOOL CO.
  - Precision Horizontal Boring, Milling Machines.
- GISHOLT MACHINE CO.
  - Gisholt Turret Lathes.
- GEO. GORTON MACHINE CO.
  - Universal Die Cutting Machines, Duplicators.
- GRANT MFG. & MACHINE CO.
  - Rivet Spinning, Vibrating Riveting, Drilling and Counter Sinking Machines.
- G. A. GRAY CO.
  - Open-Side Double-Housing Planers.
- GREENERD ARBOR PRESS COMPANY
  - Hydraulic and Hand Operated Arbor Presses.
- GROB BROS.
  - Continuous Motion Filing Machines, Metal Band Saws.
- HANNA ENGINEERING WORKS
  - Air Hoists, Pneumatic Tools, Riveters.
- HANNIFIN MFG. CO.
  - Arbor Presses, Chucks, Counter Shafts.
- HARDINGE BROS., INC.
  - Precision Bench Lathes.
- HEALD MACHINE CO.
  - Internal Grinders, Precision Boring Machines.
- HOEFER MANUFACTURING COMPANY
  - Drill Heads.
- E. HORTON & SON COMPANY.
  - Lathe Chucks, Hand-Operated Drill Chucks, Geared Drill Chucks, etc.
- KEARNEY & TRECKER CORP.
  - K & T Millers.
- KING MACHINE TOOL CO.
  - Vertical Boring Mills.
- KINGSBURY MACHINE TOOL CORP.
  - Drilling and Tapping Heads.
- LAPOINTE MACHINE TOOL CO.
  - Broaching Machines.
- LANDIS MACHINE CO.
  - Landmaco Threading Machines, Pipe Threading and Cutting Machines, Lanco Products.
- LITTLE GIANT CO.
  - Power Hammers.
- MICROMATIC HONE CORPORATION
  - Hones.
- MITTE & MERRILL
  - Keyseaters.
- MODERN MACHINE TOOL CO.
  - Combination Drill Tables.
- MOLINE TOOL CO.
  - Gang Drills.
- MONARCH MACHINE TOOL CO.
  - Manufacturers of the Monarch Lathe.
- NATIONAL MACHINERY CO.
  - Forging Machinery.
- NIAGARA MACHINE & TOOL WORKS
  - Sheet Metal Working Machines and Tools.
- NORTON CO.
  - Cylindrical Grinding, Surface Grinding, Tool and Cutter Grinding, Universal Grinding Machines.
- OLIVER INSTRUMENT CO.
  - Drill Grinders, Tap Grinders, Die Making Machines, Tool and Cutter Grinders.
- PEERLESS MACHINE CO.
  - High Speed Metal Sawing Machines.
- QUICKWORK MACHINE COMPANY
  - Rotary Shears.
- ROCKFORD MACHINE TOOL CO.
  - Tool Room Lathes, Shaper-Planers, Drill Presses, Hydraulic Machines.
- ROYERSFORD FOUNDRY & MACHINE CO., INC.
  - Improved Motor-Driven Back-Geared Upright Power Drills.
- W. J. SAVAGE CO.
  - Savage Nibbling Machines.
- SOUTH BEND LATHE WORKS
  - Engine Lathes, Precision Bench Lathes, Tool Room Lathes.
- STANDARD ELECTRICAL TOOL CO.
  - Portable Electric Drills, Bench and Pedestal Grinders, Buffers, etc.
- SUPER SPEED PRESS COMPANY
  - High Speed Presses.
- TORRINGTON MFG. CO.
  - Spring Machines.
- UNITED STATES DRILL HEAD CO.
  - Multiple Drill Heads.
- WESTINGHOUSE ELECTRIC & MFG. CO.
  - Flexarc Welders.
- WM. LAIDLAW INCORPORATED
  - Metal-Cutting Band Saws.
- WHITNEY METAL TOOL CO.
  - Ball Bearing Punches and Shears, Angle Iron Machinery.
- WIEDEMANN MACHINE CO.
  - Turret Punches.
- THE YODER CO.
  - Sheet Metal Machinery. Cold Roll Forming Machines.

16th & Santa Fe, Los Angeles MOORE MACHINERY CO. **1625 Van Ness, San Francisco**

PHILIP A. S. FRANKLIN

Announcement was made on December 31 by Philip A. S. Franklin of his retirement as chairman of the board of directors of the IMM and the United States Lines, after a career in which he started as an office boy. Mr. Franklin, now sixty-eight years of age, remains as a director of both lines, and will also act in an advisory capacity.

He was one of the country's leaders in shipping and allied industries, representing the United States Shipping Board on the exports control committee during the World War, for some time being chairman of the shipping control committee of the Board.

LEWIS LUCKENBACH

At a meeting of the board of the Cia De Navigation De Cuba, new Cuban steamship company, at Havana recently, Lewis Luckenbach was elected chairman of the board, with headquarters in that city, it was stated in press dispatches from New York. He has long been associated with his father, **Edgar F. Luckenbach**, head of Luckenbach Steamship Company, and will continue the connection.

Major General John F. O'Ryan was appointed counsel in the Cuban line. He was commander of the 27th Division of the New York National Guard during the World War.

The new line has planned a New York-Cuba and New Orleans-Cuba freight service, to be operated on a weekly schedule.

FRANK HOWLAND

After serving with American-Hawaiian Steamship Company and with Williams, Dimond & Co. when they were agent for the former, Frank Howland passed away at the age of 69 years after a lingering illness. He resided in San Francisco and left a host of friends.

CAPT. ARTHUR A. MORRIS

On January 8 Capt. Arthur A. Morris, retired commodore of the Wilmington (Calif.) Transportation Co., passed away at the Marine Hospital in San Francisco from an abdominal ailment. His boyhood was spent on the Mississippi and Ohio Rivers, and in 1887 he took charge of the Spreckels towboat fleet in San Diego, thence going with the Hercules Co. in a similar post in that city. In 1917 Capt. Morris joined the Banning, later Wrigley Wilmington Transportation, retiring from his position with them in 1937.

CAPT. AMUND UTNE, JR.

A new baby and a new ship such was the good fortune befalling Capt. Amund Utne, Jr., who brought the Westfal-Larsen liner Hardanger into Los Angeles harbor from South America on January 10. Upon arrival he received word that he is to turn the Hardanger over to Chief Officer Johannsen and proceed home to take over a new and faster ship for the California-South America trade. While Capt. Utne is in Europe he will have his first view of Amund III, born in Norway four months ago.

The new ship is being built in Italy under the barter system in payment for codfish sold by Norway in Italy. She will be larger than the Hardanger, with a speed of 14 knots and a passenger capacity of 12. She will be followed in the near future by one or two new sisterships.

Harold R. Swanton.

Capt. Giles C. Stedman

Travel is being stimulated by the exposi
this year at New York and San Francisco
cording to John M. Franklin, president, U
States Lines, now visiting the Pacific Coast. (
Mr. Franklin:

Bookings on the Washington for her
cruise to the Pacific Coast are very good. At
date, 750 passengers are signed to sail Feb
11 from New York to follow the 'Sunshine R
to the West Coast.

"K. D. Dawson, vice-president in charge o
cific Coast operations for the United States
and Panama Mail Line, reports that the pa
ger list for the return voyage will be not
sizeable, but will consist of notable travelers."

The S.S. Washington, Captain Giles C.
man, will sail on her return to New York
San Francisco on February 28.

●

Harold R. Swanton was recently appointed sales manager of all activities of Precision Bearings, Inc. (Elevated from sales manager of Industrial Division.) Mr. Swanton's new post gives him supervision of sales throughout the Pacific seaboard, where he is servicing the marine trade with anti-friction bearings.

●

PLANT

Marine

PACKINGS
INSULATIONS
REFRACTORIES

DEPENDABLE ● **EFFICIENT**

PLANT RUBBER & ASBESTOS WORKS

Sam Gillis—James Anderson
San Francisco Marine Representatives

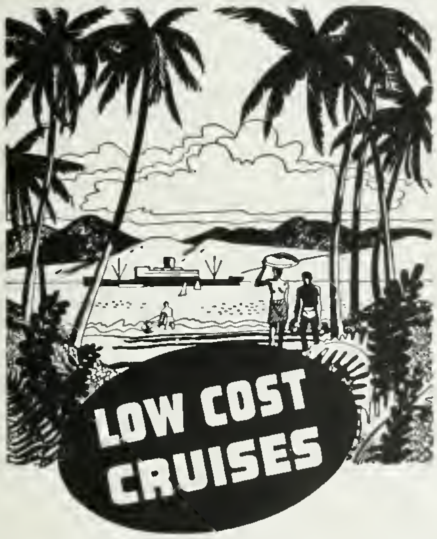
SALES OFFICES
San Francisco, Oakland, Los Angeles, Wilmington

FACTORIES
San Francisco, Redwood City, Los Angeles

ASBESTOS SUPPLY COMPANY
Distributors and Applying Contractors
Portland Seattle Tacoma Spokane

Freedom of the Sea!

WEST INDIES---SOUTH AMERICA



Let down and relax when you come aboard! Spend golden days at sea on McCormick's comfortable, steady cargo vessels. Meals served aboard have gained a reputation for their excellence. Leisurely cruising with time to enjoy every port with its distinctive life—21,000 miles of freedom of the sea for only ....**$475** *(From California Ports)*

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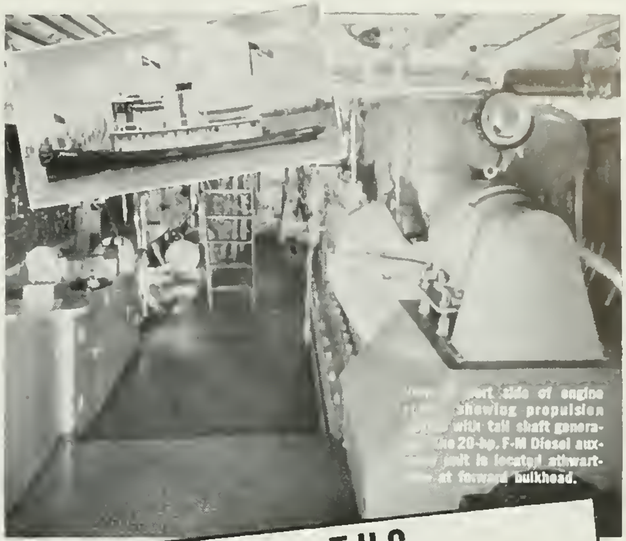
Dept. P, 461 Market St., San Francisco
DOuglas 2561

F-M DIESEL CASE HISTORIES



BUSHEY TUG *Cardinal* IS F-M *Diesel-powered*

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Foot of Fifth Avenue
Oakland, Calif.

DRYDOCK AND ROUTINE REPAIRS: Georgian, W. R. Chamberlin, Jr., Frank H. Buck, Tub Arabs, Lumbertown, Noyo, Sch. Louise.

HARBOR BOAT BUILDING CO.
Berth 264, Fish Harbor
Terminal Island, Calif.

NEW CONSTRUCTION: Two 40-foot high speed fishing cruisers.

DRYDOCK AND ROUTINE REPAIRS: Northwestern, Magellan, Cipango.

HONOLULU IRON WORKS
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LAKE WASHINGTON SHIPYARDS
Houghton, Wash.

NEW CONSTRUCTION: 200 foot steam geared turbine steel survey ship Explorer for U. S. Coast & Geodetic Survey.

LOS ANGELES SHIPBUILDING & DRY DOCK CORP.
Los Angeles Harbor
San Pedro, Calif.

DRYDOCK AND ROUTINE REPAIRS: La Placentia, M.V. Nordanger, Argyll, Cathwood, M.V. California Standard, Yacht Athene, Agwiworld, M.V. Hopecrest.

MARE ISLAND NAVY YARD
Mare Island, Calif.

NEW CONSTRUCTION:

Swordfish, Submarine (SS193); keel laid October 27, 1937; estimated delivery date August 1, 1939.

Two harbor tugs, YT 133 and YT 134; keels laid September 29, 1938.

Garbage Lighter (YG 21); keel laid July 25, 1938.

Order received for construction of one submarine tender, Fulton (AS 11); dated June 30, 1938.

Order received for construction of one submarine, Tuna (SS203); dated June 30, 1938.

DRYDOCK AND ROUTINE REPAIRS: Chester, Vincennes, Langley, Hull, Case, Tucker, Shaw, McDougal, Winslow, Oriole, Turkey, Teal, Vireo, Altair, Ramapo, California State, USAT Grant, Porpoise, Pickerel, Permit, Perch.

THE MOORE DRY DOCK CO.
Oakland, Calif.

NEW CONSTRUCTION:

Hulls Nos. 193 and 194, two lighthouse tenders for Bureau of Lighthouses; LOA 174′ 10½″, beam molded 32′, depth 14′ 6″. Twin screw triple expansion engines; water tube boiler; 1000 horsepower. One for Pacific Coast; one for Great Lakes. Keel for first ship laid December 5, 1938.

Hulls Nos. 195-196, two C-3 type cargo vessels for U. S. Maritime Commission.

DRYDOCK AND ROUTINE REPAIRS: Vancouver, Western Pacific Barge No. 3, Adventurer, Sobre Los Olas, District of Columbia, Vashon, J. B. Edwards, New Washington, Crusader, Santa Fe Barge No. 6, W. S. Miller, Capt. A. F. Lucas, Norby, New Ambassador, Olympia, Sunde, Farallon, Andrea Luckenbach, President Hayes, American Rose, Dakotan, North Cape, Sea Queen, Western Pilot, Silverbeech, Montara, Seattle, Shoshone, J. B. Walker, Silverpalm, Brunswick, Arkansan, R. J. Hanna, Waldera, Floridian, Kewanee, Hanley, Komoku, Columbian, Arizonan, Florence Luckenbach, Martindale, Abraham Lincoln, Peter Kerr, Silvermaple.

THE PUGET SOUND NAVY YARD
Bremerton, Washington

NEW CONSTRUCTION:

U.S.S. Wilson (Destroyer No. 408); standard displacement, 1500 tons; keel laid March 22, 1937.

U.S.S. Charles F. Hughes (Destroyer No. 428); standard displacement 1600 tons; order placed by Navy Department December 7, 1937. Keel laid January 3, 1939.

Ships authorized, work not started: Woban (YT138), harbor tug; Ala, (YT139), harbor tug; Barnegat (AVP10), seaplane tender; Biscayne (AVP11), seaplane tender; Monssen (DD436), destroyer.

DRYDOCK AND ROUTINE REPAIRS: Tennessee, Oklahoma, Arizona, Mahopac, Wando, Pyro.

TODD SEATTLE DRY DOCKS, INC.
Harbor Island
Seattle, Wash.

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WESTERN BOAT BUILDING CO., IN
2505 East 11th Street
Tacoma, Wash.

NEW CONSTRUCTION:

Hull No. 133, purse seine fishing bo 80′ x 20′ x 10′, powered by 200 H.P. Atl engine, for stock. Launched December 1938; completion date February 1, 1939.

Hull No. 134, tuna clipper 90′ x 24′ x 13 Launching date February 15, 1939.

Hull No. 135, small diesel ferry boa Launching date February 1, 1939.

Atlantic, Lakes, Rivers

AMERICAN BRIDGE COMPANY
Pittsburgh, Pa.

NEW CONSTRUCTION:

Ten standard coal barges 175′ x 26′ 11′, for builder's account.

Fifteen coal barges with double steel bottom 195′ x 35′ x 11′, for Central Barge Co. Chicago.

One relay barge 104′ x 34′ x 8′ for th Panama Canal. Delivery date January 1 1940.

BATH IRON WORKS
Bath, Maine

NEW CONSTRUCTION: Hulls Nos 162 and 163; DD395 Davis and DD39 Jouett; two 1850-ton destroyers for U.S Navy; date of contract September 19, 1935 Keels laid No. 162, July 28, 1936; No. 163 March 26, 1936. Launching dates, No. 162 July 30, 1938; No. 163, September 24, 1938 delivery dates, November 9, 1938, and (estimated) February 3, 1939.

Hulls Nos. 170-171, DD409, Sims, and DD410, Hughes, two 1500-ton destroyers fo U. S. Navy; contract date October 12, 1936; keels laid July 15 and September 15, 1937, respectively; launching dates, indefinite; delivery dates April, 1939, and June, 1939, respectively.

Hulls Nos. 177 and 178, DD423 and DD424, two 1620-ton destroyers for U. S. Navy. Contract date September 30, 1937;

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delivery dates April and June, 1940, respectively.

Hulls Nos. 180-181, DD429 and DD430; two 1620 ton destroyers for U. S. Navy. Contract dated August 15, 1938; delivery in 28 and 30 months, respectively.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Fore River Yard
Quincy, Mass.

NEW CONSTRUCTION:

CV7, Wasp, Airplane Carrier for U. S. Government; keel laid April 1, 1936.

Hulls Nos. 1467, Panama; 1468, Ancon; and 1469, Cristobal; three passenger and freight steamers for Panama Railroad S.S. Co.; 486 feet x 64 feet x 38 feet 6 inches; 16½ knot speed. Keels laid, Nos. 1467 and 1468, October 25, 1937; No. 1469, November 15, 1937; launching dates September 24, 1938, December 10, 1938, and (estimated) March, 1939.

Hulls Nos. 1470 and 1471, two 1500-ton destroyers for U. S. Government; delivery dates March, 1940 and May, 1940.

Hulls Nos. 1474, 1475, 1476 and 1477, four freight vessels for American Export Lines, Inc.; 450′ B.P. x 66′ x 42′3″; 16½ knots; geared turbines and water tube boilers. Keel laid No. 1474, November 10, 1938.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Sparrows Point Yard
Sparrows Point, Md.

NEW CONSTRUCTION:

Connecticut, tanker for Texas Co.; about 13,000 deadweight tons; steam turbine; launched September 1, 1938; **delivered December, 1938.**

Hull No. 4334, L. P. St. Clair, 13,000 dwt. oil tanker for Union Oil Co. of Calif. Contract signed March, 1938. Launching date December 10, 1938; delivery date early 1939.

Hulls Nos. 4329, 4330, 4331; three 16,300 dwt. ton tankers for Standard Oil Co. of N. J.; 18 knots speed. Contract signed January 3, 1938.

Hulls Nos. 4332 and 4333; two 16,000 dwt. tankers for Socony Vacuum Oil Co. Contract signed February, 1938.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Staten Island Yard
Staten Island, N. Y.

NEW CONSTRUCTION:

Hulls Nos. 8001, Navajo; 8002, Seminole; and 8003, Cherokee—three U. S. Navy fleet tugs. No. 8001, keel laying date December 12, 1938; launching date September 15, 1939; delivery date January 25, 1940. No. 8002, keel laying date December 16, 1938; launching date November 15, 1939; delivery date March 25, 1940. No. 8003, keel laying date December 23, 1938; launching date January 15, 1940; delivery date May 25, 1940.

BOSTON NAVY YARD
Boston, Mass.

NEW CONSTRUCTION:

DD402, Mayrant, and DD403, Trippe, two light destroyers for United States Navy; LBP 334′, beam 35′6″ depth 19′8″; keels laid April 15, 1937; launched May 14, 1938; estimated delivery dates January, 1940, and February, 1940, respectively.

DD415, O'Brien, and DD416, Walke, two destroyers; LBP 341′, beam 36′, depth 19′8″ keels laid May 31, 1938; launching date April, 1939; delivery dates May, 1940, and July, 1940.

DD425, Madison, and DD426, Lansdale, two destroyers; 341′0″ x 36′0″ x 19′8″. Keel laying date December, 1938; launching date April, 1940; delivery dates August and October, 1940.

DD433 and DD434, two destroyers, contract awarded July 23, 1938. Keel laying date June, 1939; launching date April, 1940; completion date, 1941.

BROOKLYN NAVY YARD
Brooklyn, N. Y.

NEW CONSTRUCTION:

CL 50, **Helena, light cruiser;** L.B.P. 600′ beam 61′7¾″, standard displacement 10,000; geared turbine engines; express type boilers; keel laid December 9, 1936; launched August 27, 1938; estimated delivery January 2, 1940.

BB 55, **North Carolina, battleship;** L.B.P. 714′ 0″, beam to outside armor 108′ 0″, std. displ. 35,000 tons; geared turbine engines; express type boilers. Keel laid October 27, 1937; estimated launching date May 1, 1940; contract delivery September 1, 1941; estimated delivery date October 15, 1941.

CHARLESTON, S. C., NAVY YARD
Charleston, S. C.

NEW CONSTRUCTION:

Order placed for **one harbor tug;** LOA 124′ 9″, length between perpendiculars 117′, breadth molded 28′, depth molded 16′; keel laid August 2, 1937; launched March 7, 1938.

Order placed for **one harbor tug;** LOA 110′ 3″, LBP 98′ 0″, breadth 24′ 0″, depth at side amidships 13′ 6″. No dates set.

Order placed for one **harbor tug;** 65 feet long.

DEFOE BOAT & MOTOR WORKS
Bay City, Mich.

NEW CONSTRUCTION:

Hulls Nos. 72 and 73; two diesel electric harbor cutters for Coast Guard; 110′ x 26′ 6″; powered by 1000 S.H.P. General Motors engines; steel construction. Delivery date April, 1939.

THE DRAVO CORPORATION
Engineering Works Division
Pittsburgh, Pa., and Wilmington, Del.

NEW CONSTRUCTION:

Hull No. 1465, one welded cargo box barge 100′ x 26′ x 6′ 6″ for stock; 165 gross tons.

Hulls Nos. 1481-1489, nine welded ash removal barges for Dept. of Sanitation, City of N. Y.; 150′ x 37′ x 12′ 9″; 4977 gross tons.

Hulls Nos. 1491-1492, two welded steel coal barges 126′ x 34′ x 17′ for stock; 1346 gross tons.

Hulls Nos. 1503-1504, two welded steel oil barges 195′ x 35′ x 9′ 6″ for stock; 978 gross tons.

Hulls Nos. 1525-1528, four welded steel coal barges 175′ x 26′ x 10′ 8″ for stock; 1888 gross tons.

Hulls Nos. 1529-1538, ten welded steel coal barges 175′ x 26′ x 10′ 8″ for stock; 4720 gross tons.

Hulls Nos. 1539-1540, two welded 3 pocket dump scows 115′ x 28′ x 7′ 6″ for stock; 240 gross tons.

Hulls Nos. 1541-1542, two welded derrick boat hulls for stock; 296 gross tons.

Hull No. 1543, one 25-ton floating crane for Navy Dept. Bureau of Yards & Docks; 335 gross tons.

Hulls Nos. 1544-1545, two welded steel hull 125 H.P. workboats for stock; 42 gross tons.

Hulls Nos. 1546-1555, ten welded steel coal barges 175′ x 26′ x 10′ 8″ for stock; 4720 gross tons.

ELECTRIC BOAT CORP.
Groton, Conn.

NEW CONSTRUCTION:

Hull No. 29, Sargo (SS188); standard displacement 1450 tons; keel laid May 12, 1937; launching date June 6, 1938; **delivery date February, 1939.**

Hull No. 30, Saury (SS189); standard displacement 1450 tons; keel laid June 28, 1937; launching date August 20, 1938; delivery date April, 1939.

Hull No. 31, Spearfish (SS190); standard displacement 1450 tons; keel laying date September 9, 1937; launching date October 29, 1938; delivery date June, 1939.

Hull No. 33, Seadragon (SS194); 1450 tons; keel laying date April 18, 1938; delivery date December, 1939.

Hull No. 34, Sealion (SS195); 1450 tons; keel laying date June 20, 1938; delivery date February, 1940.

Hull No. 35, Tambor (SS198); standard displacement 1475 tons; keel laying date January 16, 1939; delivery date January, 1941.

Hull No. 36, Tautog (SS199); standard displacement 1475 tons; keel laying date March 15, 1939; delivery date March, 1941.

Hull No. 37, Thresher (SS200); standard displacement 1475 tons; keel laying date May 15, 1939; delivery date May, 1941.

THE FEDERAL SHIPBUILDING AND DRY DOCK COMPANY
Kearny, N. J.

NEW CONSTRUCTION:

Three destroyers, DD397 Benham, DD398 Ellet and DD399 Lang, 1500 dis. tons; keels laid September 1, 1936, December 3, 1936, and April 5, 1937, respectively; launching dates April 16, June 11 and August 27, 1938, respectively.

Two destroyers, DD411 Anderson and DD412 Hammann; keels laid November 15, 1937, and January 17, 1938, respectively; **launching date February 4, 1939.**

Hulls Nos. 151, 152 and 153, three tankers for Standard Oil Co. of New Jersey; keels laid, No. 151, July 1, 1938; No. 152, July 15, 1938.

Hulls Nos. 154-159, six C-2 cargo vessels for U. S. Maritime Commission. Keels laid, No. 154, August 25, 1938; No. 155, September 20, 1938.

Hulls Nos. 160 and 161, two torpedo boat

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destroyers for the United States Navy.

Hulls Nos. 162-167, six C-3 cargo vessels for U. S. Maritime Commission.

LEVINGSTON SHIPBUILDING CO.

Orange, Texas

NEW CONSTRUCTION:

One all welded oil barge 92′ x 27′ x 6′ for stock. **Completion date February, 1939.**

One all welded boiler barge 84′ x 28′ x 7′ for Sun Oil Company, Beaumont, Tex. Delivery date March, 1939.

One all welded oil barge 173′ x 39′ x 8′ 6″ for Higman Towing Co., Orange, Tex. **Delivery date February, 1939.**

One all welded oil barge 165′ x 36′ x 9′ 9″ for Edwards Transportation Co., Houston, Tex. **Delivered January, 1939.**

One all welded 10″ hydraulic dredge 60′ x 26′ x 6′; diesel and diesel electric; for J. G. McMullen, Orange, Tex. **Delivery date February, 1939.**

One all welded tugboat 80′ LOA, 22′ beam molded, 9′ 6″ depth molded, for W. G. Coyle & Co., New Orleans, La. Powered with 550 H.P. Cooper-Bessemer diesel engine. Delivery date March, 1939.

MANITOWOC SHIP BUILDING CO.

Manitowoc, Wis.

NEW CONSTRUCTION: **Six hopper barges** 158′ x 26′ x 10′, capacity 800 tons, for Marine Transit Co., Chicago, Ill.

One river towboat 100′ x 25′ x 8′, for Marine Transit Co., Chicago, Ill.

THE MARYLAND DRYDOCK CO.

A Subsidiary of Koppers Company,
Baltimore, Maryland

NEW CONSTRUCTION:

Hull No. 194, single screw steel derrick lighter for U. S. Engineer Office, N. Y. District. LOA 115′ 9⅜″, LBP 110′, beam overall 30′ 8¾″, beam molded 30′, depth molded 11′ 9″, frame spacing throughout 21″, load displacement 438 tons, mean load draft molded 9′ 2½″. Keel laying date October, 1938; launched December 29, 1938.

THE NEW YORK SHIPBUILDING CORPORATION

Camden, N. J.

NEW CONSTRUCTION:

One destroyer tender for U. S. Navy; order placed December 27, 1937.

One seaplane tender for U. S. Navy; order placed December 27, 1937.

One destroyer tender for U. S. Navy; order placed October 14, 1938.

One seaplane tender for U. S. Navy; order placed October 14, 1938.

One battleship for U. S. Navy; order placed December 1, 1938.

NEWPORT NEWS SHIPBUILDING & DRYDOCK CO.

90 Broad Street, New York

NEW CONSTRUCTION:

H362, light cruiser, CL49, St. Louis, keel laid December 10, 1936; launched April 15, 1938; delivery date March, 1939.

Hulls Nos. 363-364, two destroyers, Nos. 413, Mustin, and 414, Russell; keels laid December, 1937; launched December 8, 1938; delivery dates April and June, 1939.

Hull No. 369, twin screw mail, passenger and cargo liner for United States Lines Co.; length 723′, beam 92′, depth 45′. Keel laid August 22, 1938.

Hulls Nos. 370, 371 and 372, three oil tankers for Standard Oil Company of New Jersey; gross tonnage about 11,500 tons; L.B.P. 525′, breadth molded 75′, depth molded 39′.

Hulls Nos. 373, 374, 375 and 376, four single screw cargo vessels for United States Maritime Commission; turbine propulsion; gross tonnage about 9000 tons; length 435′, breadth 63′, depth 40′6″. Keels laid, Nos. 373 and 374, November 14 and November 28, 1938.

58, battleship for U. S. Navy.

PORTSMOUTH, N. H., NAVY YARD

Portsmouth, N. H.

NEW CONSTRUCTION:

Six submarines, Sculpin, Squalus, Searaven, Seawolf, Triton and Trout.

THE PUSEY & JONES CORP.

Wilmington, Del.

NEW CONSTRUCTION:

Hull No. 1070, one steel hopper dredge, Chester Harding; 2,500 cubic yard capacity; length overall 308′2″, length B.P. 300′0″, breadth molded 56′0″, depth molded 29′0″. Contract date February 14, 1938; keel laid May 15, 1938; **launched January 20, 1939;** delivery May, 1939.

Hull No. 1071, one steel lighthouse tender, Lilac Class, for Dept. of Commerce, Bureau of Lighthouses. Gross tonnage approximately 700 tons. Keel laid October 17, 1938.

SUN SHIPBUILDING AND DRY DOCK COMPANY

Chester, Pa.

NEW CONSTRUCTION:

Hulls No. 172, 173 and 174, three tankers for Standard Oil Co. of New Jersey; steam turbine; 525′ x 75′ x 39′; 16,300 dwt. Keel laying dates April 18, May 31 and July 14, 1938, **delivery dates February 1, April 11 and May 15, 1939.**

Hulls Nos. 175-180, six single screw diesel cargo vessels, C-2 design, for U. S. Maritime Commission; equipped with Sun-Doxford engines. Delivery dates July 4, 1939; September 2, 1939; November 1, 1939; December 31, 1939; March 1, 1940, and May 1, 1940.

Hull No. 181, single screw steam turbo electric drive tanker for Atlantic Refining Co.; 521′ x 70′ x 40′. Delivery date March 1, 1940.

Hulls Nos. 182, 183, 184 and 185, four single screw diesel cargo vessels for U. S Maritime Commission, C-3 design. Equipped with Busch Sulzer engines. Delivery dates February 21, 1940; April 21, 1940; June 20, 1940; and August 19, 1940.

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Steamer Mericos H. Whittier: M. M. Melan; vice, C. B. MacDonald.
Steamer Arizonan: O. L. Thomson; vice, H. W. Dowling.
Steamer President Hayes: H. S. Bauer; vice, K. M. Graham.
Steamer President Pierce: S. Jokstad; vice, Harry Nelson.
Motorship Alaska Standard: K. R. Anderson; vice, Jay H. Williams.
Steamer West Camargo: N. E. Carlsen; vice, E. J. Linnander.
Steamer Makiki: O. W. Saunders, Jr.; vice, J. E. Dollard.
Steamer Maunawili: J. E. Dollard; vice, H. A. Gillespie.
Steamer Mericos H. Whittier: C. B. MacDonald; vice, M. M. Melan.
Steamer Maunalei: H. Speller; vice, M. Gordenov.
Steamer Arizonan: H. W. Dowling; vice, O. L. Thomson.
Motorship Hawaiian Standard: J. Orlando; vice, H. O. Bleumchen.
Steamer Point Lobos: E. W. Phillips; vice, Peter Odeen.
Steamer President Coolidge: Harry Nelson; vice, H. B. Bauer.
Steamer Kawanee: O. E. Lilly; vice, F. W. Rosvally.

PACIFIC MARINE REVIEW

MARCH, 1939

The CIMARRON, first of twelve high-speed tankers to be constructed under terms of an agreement between Standard Oil Co. of New Jersey and U.S. Maritime Commission

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PACIFIC MARINE REVIEW

MARCH, 1939

Official Organ

Pacific American Steamship Association

Shipowners Association of the Pacific Coast

TABLE OF CONTENTS

Editorial Comment:
Industry Pro Bono Publico 21

First American High Speed Tanker 23

American Ship Design 26
By J. Lewis Luckenbach.

Your Problems Answered 28
By "The Chief."

Steady as You Go! 31
IV Air-Borne Damage to Sea-Borne Cargoes.
By Oliver D. Colvin, Werner H. E. Hahne and Mark R. Colby.

A Remarkable Tanker Construction Record 34

U. S. Army Engineers Diesel Drive Dredge 37
By E. A. Hodge.

Some Notes on European Shipping 39

A Notable Insulation of Refrigerated Cargo Spaces 41

Trade Literature and Organization Notes 42

On the Ways:
Latest News from American Shipyards 44

Centrifugal Castings for Marine Use 47

Deceleration and Acceleration of Ships 48
II Acceleration.
By D. W. Dickie.

Measuring Oxygen Dissolved in Water 50

Draft Convention No. 53 51
By Daniel C. Roper.

PUBLISHED AT 500 SANSOME STREET . . . . SAN FRANCISCO

Entered as second class matter June 20, 1913, at the post office, San Francisco, under the Act of March 3, 1879. Published on the 1st of each month. Advertising and editorial forms close on the 15th. Subscription price, one year: Domestic, $1.50; foreign, $2.50; two years: Domestic, $2.50; foreign, $4.00; three years: Domestic, $3.00; foreign, $5.50; single copies, 25c. Chas. F. A. Mann, Northwest Representative, 1110 Puget Sound Bank Bldg., Tacoma, Washington. New York Office, Suite 404-405-406, Two Hundred Broadway, Telephone COrdlandt 7-3579.

In New York City copies of Pacific Marine Review can be purchased at the news stands of I. Goldberg, 42 Broadway; Harry Nash, 17 Battery Place; Philip Mandara, Greenwich Street and Battery Place. In Washington, D. C., at the news stand of the Carlton Hotel, 16th and K Streets.

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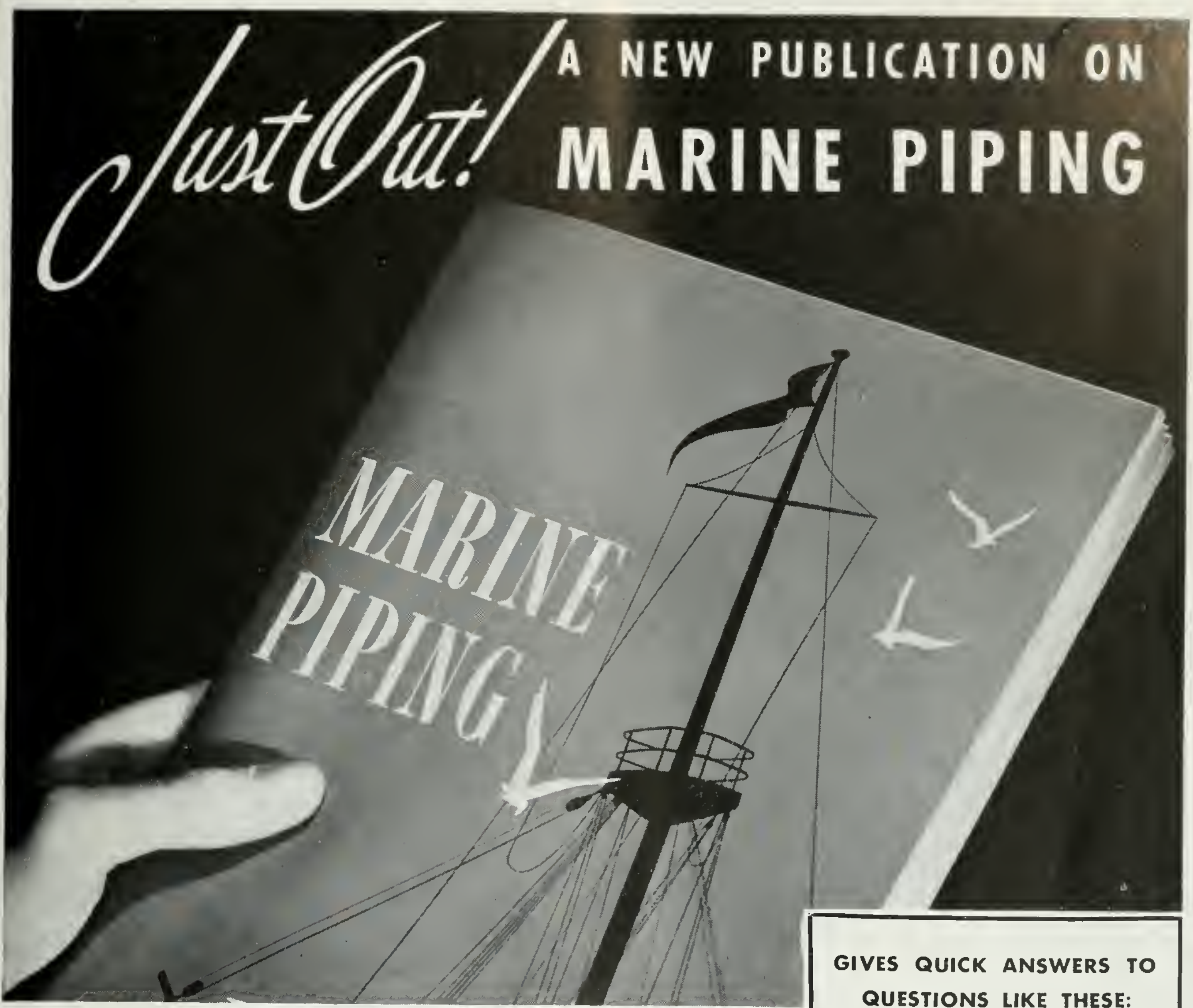

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Answer: 24 kips. (Page 23)

3. WHAT CREEP LOAD is allowable for low-carbon open-hearth steel at 1000° F.?
Answer: 4500 pounds per square inch. (Page 26)

4. HOW MUCH will 100 feet of steel pipe elongate under temperature rise of 200° F.?
Answer: 1.569 inches. (Page 31)

5. WHAT IS the shortest radius to which a 2-inch pipe can be bent?
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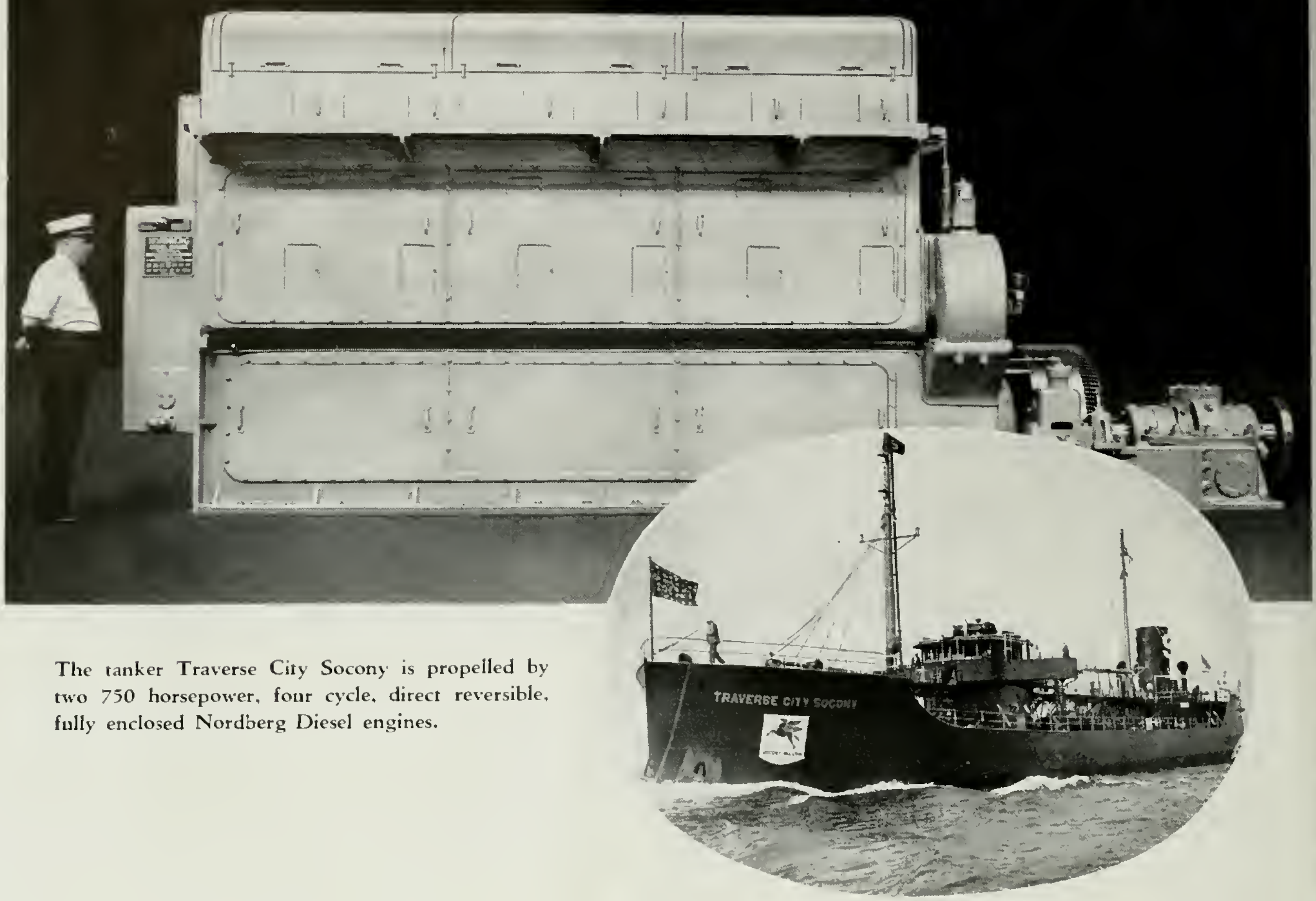

The tanker Traverse City Socony is propelled by two 750 horsepower, four cycle, direct reversible, fully enclosed Nordberg Diesel engines.

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21 ST STANDARD OIL OF NEW JERSEY TANKER TO BE EQUIPPED WITH HAGAN *Automatic* COMBUSTION CONTROL

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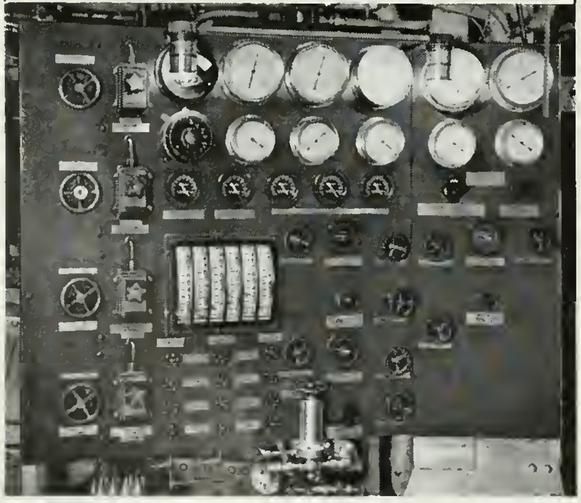
HAGAN AUTOMATIC COMBUSTION Control Panel in the fire room of S. S. W. H. Berg, similar to panel in the Cimarron.



THE new Cimarron—America's largest high-speed National-Defense (features) tanker built under agreement between the U. S. Maritime Commission and Standard Oil Company of New Jersey, and delivered to the Navy Department early this February, is equipped with the latest high-speed automatic combustion control. The first installation of Hagan Control in a Standard Oil of New Jersey tanker was made about three years ago. It worked so efficiently and reliably that Hagan Combustion Control has since been selected for twenty tankers built or being built for Standard Oil Co. of New Jersey.

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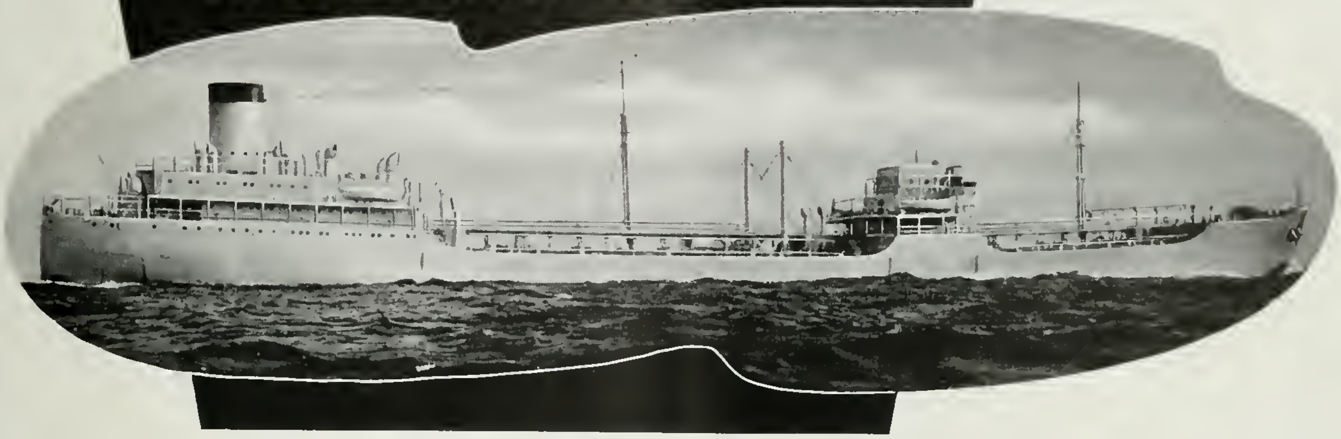

is by **DE LAVAL** *, of course*

The tanker "Cimarron," built by the Sun Shipbuilding & Dry Dock Company under contract with the Standard Oil Company of New Jersey and on February 6, 1939, sold to the U. S. Navy, is the first of a group of twelve National-Defense Features Tankers being constructed under U. S. Maritime Commission - Standard Oil Company of New Jersey Agreements by four American shipyards. All of these tankers will be equipped with De Laval "Uni-Matic" Oil Purifiers.

De Laval "Uni-Matic" Oil Purifiers on the "Cimarron" and the other tankers in this group will keep the lubricating oil in the cleanest possible condition, so that bearings and gears will receive better protection; thus they are assured longer service, lower maintenance cost.

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First with the News---
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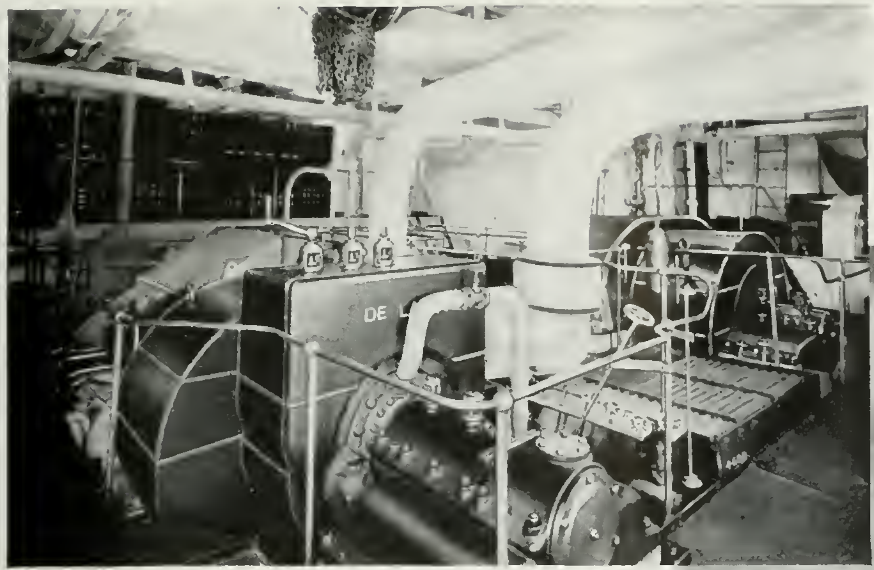

- Engine room of S.S. CITY OF SAN FRANCISCO, showing De Laval 9500 s.hp. compound turbine.

- S.S. CITY OF NORFOLK at dock as CITY OF SAN FRANCISCO (formerly S.S. CITY OF HAVRE) comes into port.

Turbines and gears reported in excellent condition after over 500,000 miles . . .

AFTER having covered over half a million miles each (average 548,800 miles) on the Atlantic for the Baltimore Mail Line, the five ships, CITY OF BALTIMORE, CITY OF LOS ANGELES (formerly HAMBURG), CITY OF NEWPORT NEWS, CITY OF NORFOLK and CITY OF SAN FRANCISCO (formerly HAVRE), have recently been transferred to the Panama Pacific Line's inter-coastal service.

Each ship is propelled by a *DE LAVAL COMPOUND TURBINE* rated at 9500 s.hp. at 95 r.p.m. propeller speed (9900 s.hp. maximum at 99 r.p.m.) and using steam at 250 lb. gage with 100° F. superheat. Trial speeds of 17.7 to 18.4 knots were shown and on 13 voyages four of the ships developed an average speed of 16.82 knots on a fuel consumption of approximately 0.7 lb. of Bunker C oil per s.hp.

An account of the vessels in the November, 1938, issue of PACIFIC MARINE REVIEW states: "On examination the turbines and gears were found in excellent condition, with no appreciable wear and with only minor adjustments necessary to prepare them for the new service."

Each ship is also equipped with two De Laval boiler feed pumps and two De Laval turbines to drive the forced draft fans.

Records of the performance of De Laval propelling equipment on ships of the type in which you may be interested will be supplied upon request.

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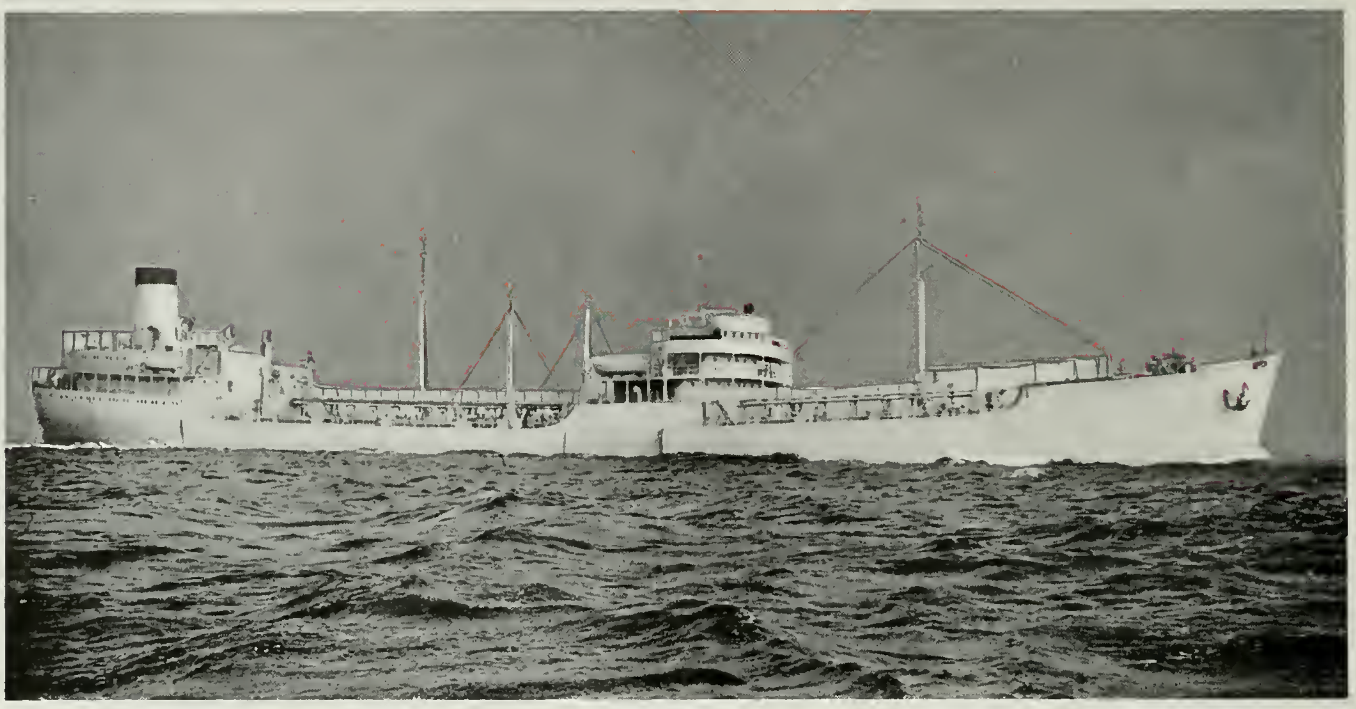


The "CIMARRON"

AMERICA'S FASTEST TANKER

Coated with

Germicide

Anti-Corrosive — Anti-Fouling — Boottopping

This vessel is the first of twelve high-speed National-Defense Features Tankers constructed under an agreement between the United States Maritime Commission and the Standard Oil Company of New Jersey. She is now a United States Navy tanker.

AMERICAN MARINE PAINT CO.

SAN FRANCISCO NEW YORK

PACIFIC MARINE REVIEW

VOLUME XXXVI MARCH, 1939 NUMBER 3

Industry Pro Bono Publico

On several occasions we have commented: first, on the fact that much of the present public outcry against "Business"—"Industry" — "The Capitalistic System" and "The (so-called) Malefactors of Great Wealth" is due to ignorance on the part of the public; second, on the evident reluctance of business leaders to frankly publish inside information with the object of clearing up this ignorance; and third, on the necessity for a greater number of intelligent public relations counsellors who could bring big business and the public into a more harmonious relationship. We were therefore glad to see the following editorial in "The Power Specialist," under the caption "Industry's Real Contribution":

"The gist of the remarks of many of our soap-box orators these days are so uncomplimentary to business that they have caused many people to lose sight of business' real significance in our national life.

"The fact that this has been the case is, in our opinion, largely attributable to the public's complete lack of information about just what industry means.

"Business has never thought it necessary to take the time to give the public the 'low-down' on the operations of industry—how much it means to the workers of the country, what its real magnitude is, in what proportion the employees benefit in comparison with the owners' share of profits, how the taxes levied on industry are a major factor in government income, and how carefully corporations have to be managed to conserve funds against the inevitable wearing out of machinery and the emergencies which so often arise.

"If that type of information had been before the public a few years ago, and the country knew the 'inside,' much current misinformation could have been avoided.

"Of particular interest at this moment is a recent summary of corporate income and expenditures from 1929 to 1935, compiled by the National Industrial Conference Board from U. S. Government records. Two facts of this study are extremely significant: first, that during those seven years (the duration of the greatest depression in our history) American industry sold to its customers over *three hundred and sixteen billion dollars worth of goods;* that fact in itself is ample to show the immensity of industry and the tremendous part it plays in our economic life.

"Moreover, it means that the instruments creating such a huge part of the nation's wealth must be preserved and fostered if our progress toward a constantly improving standard of living is to be resumed.

"The second fact of this great significance in the study is this: Out of the money available for distribution after raw materials had been bought, taxes paid, and the overhead items of business taken care of, 90 per cent went to employees and management in wages and salaries, leaving 10 per cent for stockholders. Thus the workers benefited nine times to the owners' one in splitting the dollar left after necessary operating costs had been met.

"These are not, of course, the only figures shown by the Industrial Conference Board's report, but they give an idea of the extent to which the books have been bared. The tax bill has been broken down, the cost of raw materials and transportation is shown, as is the amount put aside for wear and tear on machinery and many other items.

"It is this type of frankness which takes industry out of the class of being a mysterious juggernaut, always suspected of exploiting employees and the public. The more we have of it, and the more employees realize that by far the greater share of corporate funds go to them than go to owners, the less will we hear the unwarranted cry, thieves, pirates, robbers!"

First
AMERICAN HIGH SPEED TANKER

"CIMARRON" First of Twelve Large National-Defense Features Tankers Delivered to United States Navy

The Cimarron, first of the group of twelve National-Defense features tankers, was launched at the plant of the Sun Shipbuilding & Dry Dock Company, Chester, Pa., on Saturday, January 7. She was sponsored by Mrs. Wm. D. Leahy, wife of Admiral Wm. D. Leahy, Chief of Naval Operations, United States Navy. The christening took place in the presence of several thousand people, including Government and company officials. The launching was successful in every respect and the Cimarron was immediately towed to the yard's fitting-out dock, where she was made ready for her official sea trials over the Naval Trial Course off Rockland, Maine. These successfully completed, she was taken over by the United States Maritime Commission and delivered to the U. S. Navy Yard at Philadelphia, Pennsylvania, February 6.

The vessel is of the single continuous freeboard deck (with poop, bridge, and forecastle erections), twin longitudinal bulkheaded, type of bulk oil carrier with propelling machinery located at the after end. Special attention has been paid to fireproof construction and equipment; the accommodations for officers and crew are ample and modern; and all up-to-date navigating equipment has been provided.

The ship is fitted with two all-steel masts and two steel Samson posts, the foremast equipped with a five-ton capacity steel cargo boom on the forward side of the mast and each of the Samson posts equipped with two steel hose-handling booms, a two-ton capacity boom on the after side and a four-ton capacity boom on the forward side, and provisions for the installation of a 40-ton boom.

The particulars of the vessel are as follows:

Length overall	553′ 0″
Length between perpendiculars	525′
Breadth molded	75′
Deadweight on 30′ 0″ draft	16,735 tons
Deadweight on 31′ 7⅝″ summer freeboard draft	18,230 tons
Cargo capacity	147,150 bbls.
Trial speed	18 knots
Total complement accommodated	69

The Cimarron is propelled by Westinghouse turbines developing a normal shaft horsepower of 6750 per shaft on two shafts, the shaft r.p.m. to be 96 at this 6750 S.H.P. Steam is supplied by four Babcock & Wilcox sectional header watertube boilers designed for working steam pressure at the super-heater outlet of 450 lbs. per sq. in. and a total temperature of about 750° F. Each boiler is fitted with Todd oil burners.

The engines on each shaft consist of one high pressure ahead and one low pressure ahead turbine arranged in separate casings with an astern turbine in the low pressure ahead casing. There are two main condensers and one auxiliary condenser. The machinery equipment also includes two 400 K.W. 230 volt, 3 phase, alternating current geared turbo-generator sets. The vessel has two cargo oil pump rooms—one aft being provided with centrifugal main cargo pumps—actuated by motors located in the turbine machinery space, and a steam actuated vertical reciprocating stripper pump, and a midship pump room provided with steam actuated vertical reciprocating main cargo oil and stripping pumps.

● Hull Features

A cruiser stern and a bulbous bow are noticeable features of the hull design.

The bow carries fittings for a paravane.

Extensive welding was used in bulkheads, bottom and side shells, and in deck houses.

All features for safety of navigation, safety of working conditions, and safety against fire menace that have been approved through the long experience of the Standard Oil Company of New Jersey are incorporated in the construction and the equipment of this tanker and her 11 sisters.

American Marine Paint Company's "Germicide" anti-corrosive, anti-fouling, and boot-topping were used as shell coatings on this hull for speed and protection.

Power Plant

As indicated above, the propulsion plant consists of two Westinghouse double reduction geared cross compound turbine units. These units are of the most modern design, into which Westinghouse has built the best results of over 30 years' experience in the design and construction of marine geared turbines.

Each unit comprises one high pressure and one low pressure turbine of the combined impulse and reaction type arranged for cross-connection operation. Each unit actuates its line and propeller shafting through Westinghouse double reduction gearing enclosed in a single case.

Each unit is designed to develop its normal output of 6750 shaft horsepower (when supplied with steam at 425 pounds per square inch gage pressure and 725° F. total temperature, and when exhausting into a vacuum of 28½ inches) at a propeller shaft speed of 96 r.p.m.

For reversing, a two stage impulse type "astern" turbine is incorporated in the exhaust end of each "ahead" low pressure turbine.

Propeller thrust is absorbed through a Kingsbury type thrust bearing mounted in the forward end of the gear casing on the low speed gear shaft of each unit.

Three nozzle groups distribute steam to each unit turbine. These are arranged with hand operated nozzle control valves for overload and for reduced power operation, in addition to the main control of the primary nozzle group.

Cross connection piping between the high and low pressure turbines in each unit is arranged to permit either the high or the low pressure turbine to be operated singly for driving the propeller shafting in emergency "ahead" operation.

The Condensers

Each low pressure turbine casing is mounted on top of and exhausts directly into an athwartship surface condenser of the two pass radial flow type with 6500 square feet of cooling surface. Each condenser has a capacity for condensing 52,000 lbs. of steam an hour under a maintained vacuum of 28 inches Hg. and when supplied with cooling sea water of 80° F. temperature at the rate of 10,500 gallons per minute. Westinghouse twin element two-stage air ejectors fitted with intermediate and after condensers of the surface type serve each condenser.

Reduction Gear Conditions

At normal full power operation, that is, with each turbine of each unit developing 3375 shaft horsepower and the propeller shaft turning at 96 revolutions per minute, the high speed pinion of the high pressure turbine turns at 5855 r.p.m., the high speed pinion of the low pressure turbine at 4725 r.p.m., and the low speed pinion at 527 r.p.m. The high speed pinions and high speed gear wheel have pitch circle diameters of 8.075 inches, 10.006 inches, and 89.71 inches, respectively. For the low speed pinion and wheel the respective pitch circle diameters are 20.064 inches and 111.80 inches. Under these conditions of power and speed the ratio (tooth pressure per inch of face divided by pitch circle diameter in inches) for each of these pinions is: high pressure high speed, 67.8; low pressure high speed, 54.7; and low speed, 56. This rating is considered conservative for continuous service.

Feed Pumps

One of the most important units of the marine power plant, and increasingly so as the steam pressures rise, is the feed pump which returns the condensate and supplies make-up feed water to the boilers. On the Cimarron and on all her 11 sisters this function is entrusted to a pair of De Laval turbine drive centrifugal pumps, each of which is capable of taking care of the boiler requirements at full load. The pumps are three stage and are directly connected to the turbine, which drives them at 4,000 r.p.m. The pumps have 4-inch diameter suction openings and 3-inch diameter discharge. At normal speed each pump will deliver 300 gallons of water per minute against a discharge pressure of 575 pounds per square inch gage with the water at a temperature of 235° F. The impellers of these pumps and all internal parts are of acid resisting bronze.

The steam generating plant on the Cimarron consists of four boilers of the Babcock and Wilcox single pass sectional header marine type equipped with water cooled furnace and designed for high combustion efficiency, low maintenance costs, and savings in space and weight. These boilers have built in superheaters and combustion air heaters. Combustion air passes through the heaters in the uptake down the back of furnace between furnace wall and casing, across the bottom of furnace and up to the burners. There are no baffles either in the banks of boiler tubes or in the air pre-heater tubes.

Designed Performance

The design of the turbines called for a guaranteed performance to give the following results:

When the turbines are operating "ahead" non-bleeding and supplied with steam at 425 lbs. (gage) throttle pressure, 725° F. total temperature and 28½-inch vacuum at the turbine exhaust, the steam rate per shaft horsepower hour is under 7.1 lbs.

The propulsive power plant and boiler installation are designed to afford a fuel consumption of less than 0.60 lbs. (of 12° API—85 seconds Saybolt U. Viscosity fuel oil) when the plant is operating at normal sea service power.

Deck Machinery

Deck auxiliaries for the Cimarron were supplied by the American Engineering Company and include steering gear, winches, and windlass. The steering gear is of the electro hydraulic quadrant type arranged to be controlled by manually operated wheel or by gyro pilot. The winches and windlass are steam engine operated.

Navigation Equipment

The navigation and communication equipment includes: complete radio equipment and radio auto alarm; a radio direction finder; a 24-inch Navy standard searchlight; a Submarine Signal Company Fathometer; and Sperry gyro pilot, Sperry master gyro compass and repeaters, and Sperry Course Recorder.

A Carrier Corporation refrigerating plant will take care of the steward's perishable stores. This plant is of the direct expansion Freon type with full automatic control. It is designed for economic, dependable operation with a minimum of control.

- **Trial Tests**

Cimarron on January 24 left the Sun yard at Chester loaded with a large party of technical experts representing the U. S. Navy, the U. S. Maritime Commission, the Standard Oil Company of New Jersey, the Sun Shipbuilding and Dry Dock Company, the Westinghouse Electric and Manufacturing Company, the Babcock and Wilcox Company and all the parties concerned in the equipment and machinery under test.

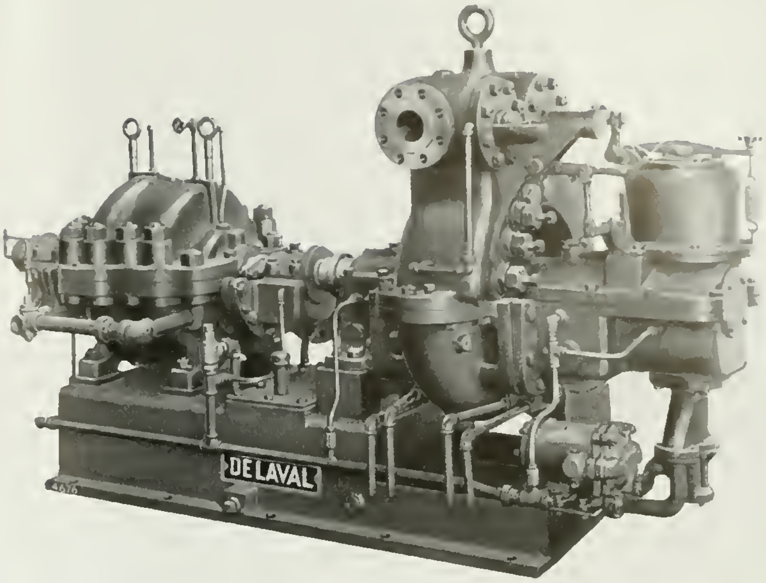
She proceeded to Rockland, Maine, where on January 25, 26 and 27 she was subjected to a very grueling Navy Standard Trial for speed, economy, and maneuverability.

In speed she easily exceeded 18 knots, making that speed at a propeller speed of 92.5 r.p.m.

In economy her normal full power run results show a fuel consumption of less than 0.6 pounds per shaft horsepower hour.

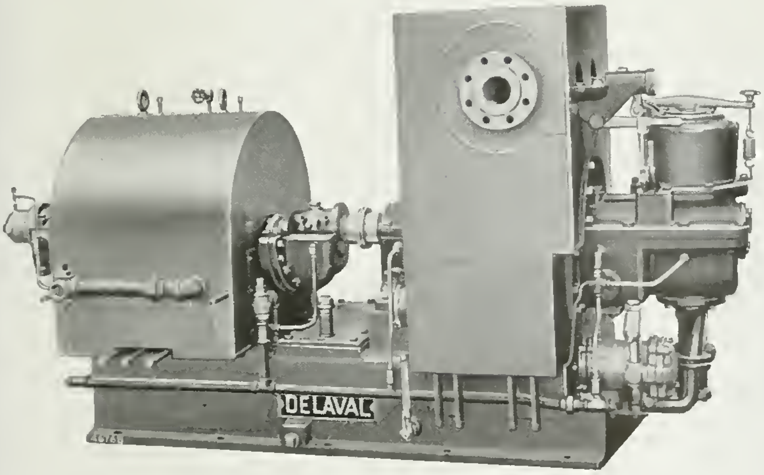
In reverse she develops 78 per cent of her full ahead power. In maneuvering she proved herself very handy, turning in comparatively small circles and stopping from full speed in remarkably short time.

All hands were agreed that the lines of the Cimarron have produced a very seaworthy hull with a very comfortable, easy motion in a sea way.


One of the De Laval turbine driven boiler feed pumps as installed on high speed oil tankers; 300 g.p.m. at 235° F. water against 575 lb. at 4,000 r.p.m.

This group of twelve ships is being constructed under the terms of an agreement entered into by the Standard Oil Company of New Jersey with the U. S. Maritime Commission on January 3, 1938. According to the provisions of the agreement the Government's defense-feature expenditure for the building of these vessels amounts to a total of $10,563,000 and the company's share of the expense will total $26,993,004. No "subsidy" is involved. Four shipyards, namely, Bethlehem Steel Company, Shipbuilding Division (Sparrows Point); Federal Shipbuilding and Dry Dock Company; Newport News Shipbuilding and Dry Dock Company; and the Sun Shipbuilding & Dry Dock Company; will each build three of the ships.

The three vessels at Sun will be identical to the Cimarron.


One of the De Laval turbine driven boiler feed pumps with lagging applied

The three building at Federal differ in that they will be propelled by General Electric geared turbines.

The three building at the Bethlehem yard will be propelled by Bethlehem-Parsons turbines operating through De Laval gears and taking steam from Foster Wheeler boilers.

The three building at Newport News will have Newport News-Parsons turbines, De Laval gears, and Foster Wheeler boilers.

The main reduction gears for the six tankers being built by Bethlehem and Newport News will be of the double helical, double reduction type, designed and manufactured according to the usual De Laval standards. The high pressure pinion will run normally at 5494 r.p.m. and the low pressure pinion at 2714 r.p.m. for 95 r.p.m. of the propeller. Each of these pinions will mesh with a first reduction wheel, which is to be mounted on a solid shaft extending through the corresponding hollow second reduction pinion and connected to the latter by another flexible coupling of the claw type. The two second reduction pinions mesh with one large gear wheel mounted on the main gear wheel shaft by forced fit and screwed keys. The main gear wheel shaft also carries the thrust collar for the Kingsbury type main propeller thrust bearing, which is arranged at the forward end of the gear case. This large gear wheel is approximately 128 inches in diameter and its designed normal speed is 95 propeller r.p.m. when transmitting 6750 s.h.p.

American Ship Design

Some Notes on Recent Practice In Naval Architecture and Marine Engineering

By J. LEWIS LUCKENBACH
President, American Bureau of Shipping

Editorial Note: *The renaissance of American shipbuilding is being very keenly scrutinized by many observers, but by none more keenly or more intimately than by the trained experts of the American Bureau of Shipping. The following excerpts taken from the address of President Luckenbach at the annual meeting of the Bureau reflect the findings of these experts and should be of intense interest to all American naval architects, marine engineers, shipbuilders and shipowners.*

It is with considerable satisfaction that I am able to report the fact that of the total of 280,700 gross tons of steel vessels completed in the United States during the year 1938 there were classed with this Bureau 265,355 gross tons, or 94.5 per cent.

The general design of new tonnage submitted during the year, the bulk of which is composed of cargo vessels, shows a trend toward greater economy of operation, due to increased machinery efficiency and cargo handling facilities, larger carrying capacity, increased speed, and a higher ratio of cubic capacity to deadweight. Increased emphasis is being placed on such important safety features as subdivision, stability and fireproofing. Thoroughly modern living quarters for all the ship's complement are included in every class of vessel now under construction.

Tankers are showing increased ratios of deadweight to displacement due to improved design and the use of welded construction. They are likewise being designed for higher speeds, although no tankers have been laid down for purely private account with speeds such as those being built for the Standard Oil Company under a special arrangement with the Navy Department and the Maritime Commission but I believe that an all-welded ship of this type and speed may be expected to be laid down shortly.

● Steam Drives

Propulsive machinery includes turbo electric as well as geared turbine drive. Water tube boilers burning oil fuel are universally adopted, often with automatic combustion control. Steam pressures and temperatures have in several cases been increased from the prevailing 450 lbs. and 750° total temperature to 675 lbs. and 900°. One design is now under consideration which contemplates use of steam in the neighborhood of 1200 lbs. at 950° total temperature. Auxiliaries are being quite commonly electrically driven.

● Diesel Drive

Internal combustion engines of large size are again appearing in a considerable proportion of tonnage now contracted for, including geared as well as direct drive, there now being some 18 on order for the Maritime Commission. It is interesting to note this change in trend toward a wider adoption of the internal combustion engine, which has not generally found great favor in the larger units in the United States. These should in a few years show some interesting comparisons with the similar vessels which are being constructed but with steam propulsion.

● River and Lake Craft

Little change in design or in size of river vessels is apparent, although there is a definite trend toward the adoption of tunnel stern propellers for tugs as against the time-honored sternwheel.

On the Great Lakes, special steels having high resistance to damage through impact without a sacrifice of weldability are coming into use for tank tops and other parts receiving continued abuse from bulk cargo handling apparatus. Experience gained from this source may indeed be beneficial to our deep water vessels where the omission of tank top ceiling through the introduction of welding might tend to include the use of a more durable material.

● Increase of Welding

Welding is being more and more widely adopted in every branch of ship and engine building. In this connection, I might say that in 1928 the American Bureau of Shipping classed 52 vessels under 300 feet long, only one of which was all-welded. Last year, out of 156 vessels under 300 feet long classed with the Bureau, no fewer than 136, or 87 per cent of the total, were all-welded. While welding development in the larger classes of ships has naturally enough been less spectacular, there is no ocean-going ship of any type built today which can properly be termed all riveted, the proportion of welded to riveted construction varying between 5 per cent up to 100 per cent in the case of the new 521-foot tanker being built by the Sun Shipbuilding Company for the Atlantic Refining Company, the same owners who built the J. W. Van Dyke, delivered last year, where the whole tank space for a distance of 353 feet was welded, the extreme ends only being riveted. This vessel was one of two large tankers of almost entirely welded construction which went into service during 1938. Their service records, including their encountering of the September hurricane, amply justify the owners of one of them in having ordered a completely welded vessel of similar size. Welding of many parts of the large cargo vessels now under construction, including inner bottoms, bulkheads and shell butts is replacing riveting. It is practically certain that the trend toward welding will continue as increased use of the process tends to develop further economies from the standpoint of simplicity and cost of construction and upkeep. As welding becomes more universally adopted and as familiarity with this type of construction increases, repair costs should diminish, as the necessity for a shift of butts, etc., is eliminated, owing to the fact that with proper design and good welding a continuous member is created with no weak links such as are unavoidable in the case of riveting.

Coastwise Aid Needed

It is to be hoped that, while so much new legislation is under consideration, none will be enacted which might be harmful to and militate against our Great Lakes, coastwise and intercoastal services. Moreover, should the Government find it necessary to assist the railroad industry, which is in dire straits, an opportunity may be afforded to extend aid as well to those companion services, the coastwise and intercoastal carriers, which would tend to bring new and up-to-date tonnage into the field—a field which is ever available for our national defense.

Commission Makes Fine Record

The United States Maritime Commission has continued to make a fine record of achievement in its progress toward the twin objectives of national defense and the upbuilding of the American Merchant Marine as set forth by law. The fact should not be forgotten that in addition to the initiating of a building program, the Commission has put into effect a really constructive plan for training an efficient and loyal personnel, without which ships are badly handicapped.

The most serious problem, however, remains to be solved, and before closing these remarks I wish earnestly to recommend to all of you here that you give it due thought and consideration. What will be done with the ships now building to and planned for Maritime Commission account?

Shipowners' Problems

The limited earnings experienced by capital invested ashore in recent years compared to the earnings of previous times should tend to divert some of the present surplus funds into investments in shipping, if this business can be made attractive.

The greatest single handicap, which in the past has militated against the development of a private merchant marine, has been eliminated by law in the provision for equalizing with world prices the cost of construction of the ship itself. This alone will not give parity to operation in the foreign trade, however, and it is to be hoped that the definite aids now permitted by law to offset the additional costs of the American shipowner over a protracted period may be broadened and their permanence assured in order that capital so sadly necessary may again be directed into our merchant marine.

Could that element of permanence and stability be established in our merchant marine, I would feel no worries as to its future.

Following the World War we found ourselves possessed of a large amount of tonnage, most of which, even at that time, was in a great measure obsolete, as it had generally followed designs which were some ten or more years old when adopted. In order to make them commercially competitive, endeavors subsequently had to be made on many of these ships to obtain higher speeds and lower fuel consumption, even to the extent of lengthening the vessels, changing rudders and wheel apertures and altering or completely renewing power plants. This condition will not exist when these ships now building come to be substituted for the ships now in operation, as fullest advantage is being taken of all modern design developments, and the new ships as a fleet should outclass any group of vessels now in existence from the standpoint of efficiency.

The Future

The future of our merchant marine lies along either of two paths—Government ownership and operation or private ownership and operation—and it is to be hoped that our Government will grant a policy sufficiently liberal so that additional private capital may again be drawn into the shipping business, and that a merchant marine of the newest and most up-to-date type, privately owned, may be the outcome. The attitude of the Government and the shipowner in this country will determine which path is to be taken.

A Sound Powered Telephone

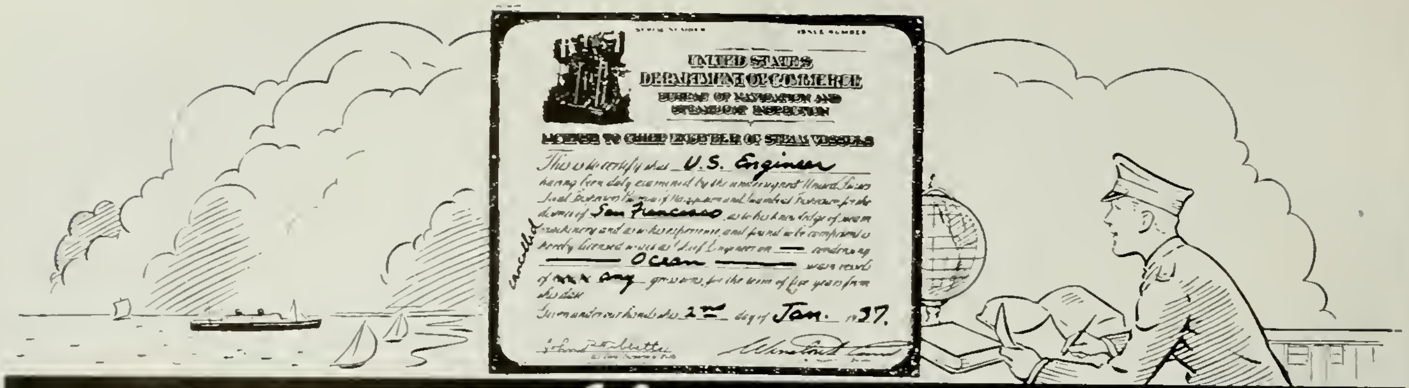
A new telephone instrument which gets its power solely from the speaker's voice and enables the user to call any of five other stations has been announced by the Western Electric Company.

Designed primarily for use on shipboard, the new device represents the acme of reliability. Failure of the ship's electrical supply system cannot affect the new telephone's operation because its electrical voice current is generated internally by the impact of sound waves on a special diaphragm and hence it is independent of external power. A self-contained, hand operated generator provides for signaling.

As many as six instruments may be connected to form a network in which calls may be made between any two telephones or "conferences" held over the entire system. To place a call, the user turns a simple rotary-selector switch to the station desired and spins a small signaling crank on the side of the instrument. This causes the distant telephone to emit a high-pitched tone signal of great penetrating power. Additional stations may be combined in the one system but selective signaling is limited to six positions.

Although the device was designed primarily for marine use, its watertight, weather-resistant construction adapts it ideally for service in construction camps, warehouses, factories or other exposed locations. All internal parts are assembled in a sealed, cast aluminum case. The transmitter diaphragm, which mounts in front of an aluminum cover plate, is coated with a non-corrosive, moisture-proof finish. A soft-rubber housing encloses the receiver, the diaphragm of which is also finished to withstand corrosion.

Known as the 11A Magnetic Telephone, the new instrument is intended for communication only at close range, but a measure of its effectiveness may be gained from the fact that suitable transmission was obtained over an artificial line of No. 9 copper wire 200 miles in length.



UNITED STATES
DEPARTMENT OF COMMERCE
BUREAU OF NAVIGATION AND
STEAMBOAT INSPECTION

LICENSE TO CHIEF ENGINEER OF STEAM VESSELS

U.S. Engineer

San Francisco

Cancelled

Ocean

any

2nd Jan. 37.

Your Problems Answered

by "The Chief"

The word "Cancelled" was inscribed on face of the above license at the direction of the Bureau of Marine Inspection and Navigation. As used here it means "Specimen Copy."

AUXILIARIES II

THE ROTARY PUMP

QUESTION

Other than standard reciprocating steam pump, duplex or simple, what types of positive pressure pumps are there?

ANSWER

There are many, listing all the way from the simple spur gear type to the most complex. Study the several figures herewith.

The principal characteristic of a positive pressure pump is that it delivers its fluid positively with its rotation just as a piston forces its fluid out the discharge valve, as distinguished from the centrifugal. The positive pressure pump cannot operate against a closed discharge valve. The speed and rate of delivery are proportional and zero flow means zero speed, or more accurately, at zero flow the pump speed would be proportional to the slip or loss or leakage of the pump. Also pressures can reach destructive values and relief valves may be desirable.

Figure 1 is the spur gear pump. Note that the flow through the pump is deceiving. Instead of dragging the fluid into the mesh of the gears as they would a piece of solid material, such as a bit of string, they squeeze the fluid out of the mesh and drag it around the outside between the gears and casing.

The leakage is between the gears and between them and the casing. They are very good for substances which have some lubricating value and are frequently used for water. They may run at about 1,000 r.p.m. with oils and thick fluids and 2,000 r.p.m. or more if herring-bone cut of tooth and lighter liquids (see Fig. 8). They may be used at high fluid pressures up to perhaps 1,800 lbs. per sq. in.

A different design is shown in Fig. 2, where the driver meshes the internal gear and drags it around.

The principle of a sliding gate or vane in a rotor has been used in many ways: one of them is shown in Fig. 3.

Figure 5 is an adaptation of the gear pump in which only three specially shaped teeth or lobes on each wheel mesh with each other and squeeze out between each other but

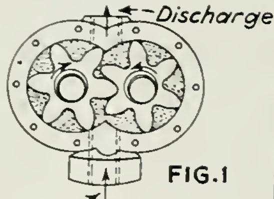


FIG.1

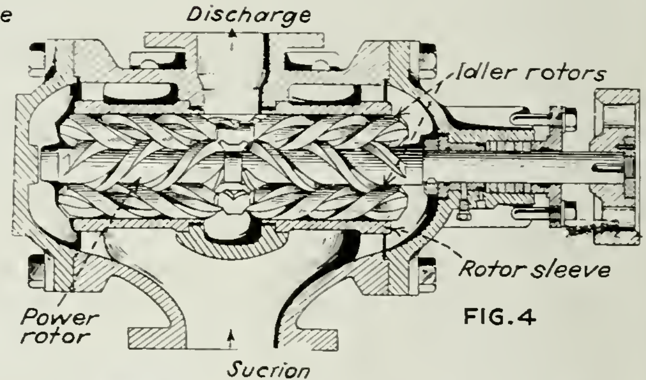


FIG.4

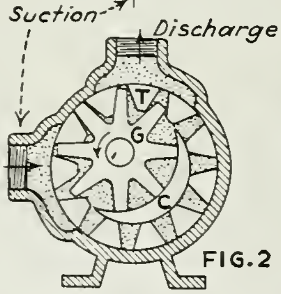


FIG.2

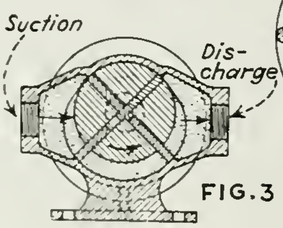


FIG.3

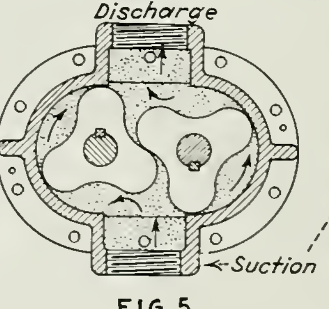


FIG.5

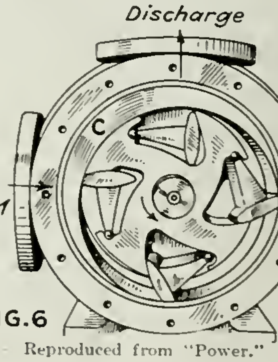


FIG.6

Reproduced from "Power."

trap fluid between each and the casing.

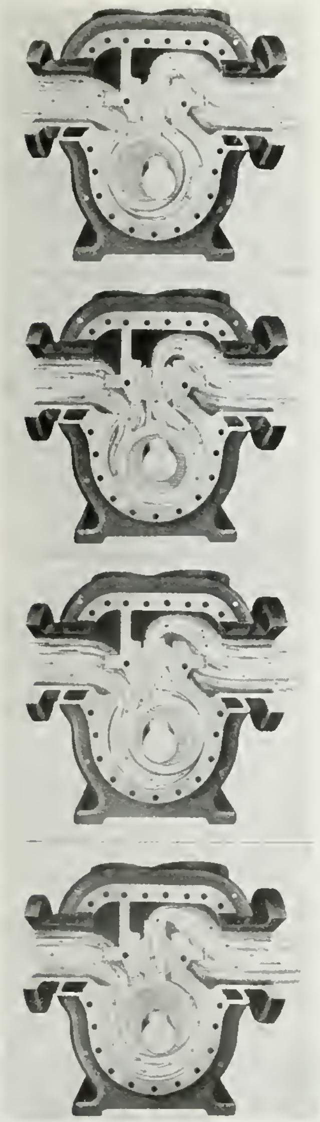
A very widely used and popular pump is the screw pump, one of its forms being shown in Fig. 4. The principle of operation is shown in the cut. In handling fluids with lubricating qualities these pumps may be operated up to 400 or 500 lbs. per sq. in. and very high speeds.

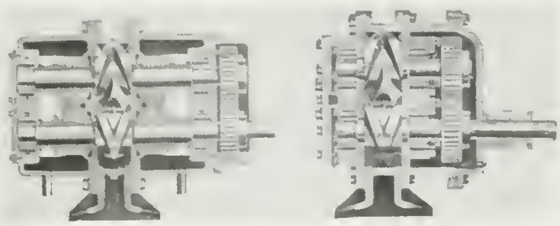
Figure 6 is illustrative of the swinging vane principle in rotary pumps.

Figure 7 shows four phases in a complete revolution of a very widely used rotary pump. The principle and valve action of the sliding valve and eccentric are clearly shown. Here again some lubrication in the fluid handled is desirable.

Where lubrication from the fluid to be handled cannot be obtained it is necessary that the moving parts be kept apart, yet maintaining at all times the very close clearance of a mil or two in all positions of the revolution.

This requires on the revolving members bearings which have no radial clearance; bearings which definitely fix the axial position; and carefully cut gears, carefully positioned on each shaft and meshed to each other so that the drive from driver to driven will not require physical contact between the pumping members, but will be all through the gear. This is illustrated in Fig 8 at the left. The gears and bearings run in their own casing and lubricant. If the fluid handled is oil, then the stuffing boxes may be eliminated except for one, as in Fig. 8 at the right. These pumps may be run at very high speeds and pressures. The principle is that of the gear pump.





Figs. 7 and 8

Questions From Readers

"Please explain the following from a Navy Department handbook treating on make up feed—if the hardness is greater than 2 grains per gallon (34 parts per million) it shall not be used. As a rule the hardness should not exceed 1 grain per gallon (17 parts per million).

"Could you explain to me the parts per million scale and the corresponding grains per gallon?

"Would you please inform me also of publication dealing with feed water treatment?"

W. E. H., Oakland, Calif.

ANSWER

Your question and many others on the general subject of "water" will be covered in a series of articles starting this year in this section.

These scales for measuring impurities in water are on a weight basis. A definition of the "grain" as a unit of weight is: 7000 grains is the equivalent of 1 pound, or one grain equals 1/7000 pound.

A gallon of water weighs 8.3356 pounds or 58381 grains at standard temperature and volume, so that one grain per gallon would be 1 grain per 58,381 grains. $\frac{1}{58,381} = \frac{17.15}{1,000,000}$, so that 1 grain per gallon equals 17.15 parts of a million, or practically 17 parts per million.

Dealing with such small weights of impurities as is necessary with water, it is desirable to have a scale a little finer than grains per gallon, hence the parts per million are used. Chemists are continually using the parts per million scale, and referring it to the grains per gallon scale is simply a concession to the operating engineer.

Information on books on this subject is going to your address as given.

QUESTION

"It is requested that I be furnished with copies of curves (nomographs) showing relative propeller characteristics mentioned on page 24 of the January, 1939, issue of the Pacific Marine Review.

"Stamped and addressed envelope is enclosed."

Lt. Commander R. B., Washington, D. C.

ANSWER

The Slip-Speed-R.P.M. nomograph is being mailed directly to address given. Additional copies are available on request.

The accuracy of this chart is not better, probably less, than the slide rule. It is in effect a slide rule or a combination of two or more rules having a permanent setting to solve some given equation.

QUESTION

Is the flow from a positive pressure pump steady like it is from a centrifugal pump?

ANSWER

No. The flow from any positive pressure pump will always be intermittent. That is, the fluid will be delivered from the low pressure side to the high pressure side in small packages or parcels, but each separate from the others like links in a string of sausages. Each portion or parcel must first be separated from its parent stream in the suction or low pressure parts, then opened to its mates in the high pressure parts. Then it is forced out against this pressure. All piston and rotary pumps do this. The centrifugal is the only pump which does not deliver in parcels. Thus, if a steady, non-pulsating flow is necessary, an expansion chamber may be desirable. It is seldom used, however, as gear and rotary pumps may be used which deliver such a large number of such small parcels so rapidly that the pulsating pressure is not perceptible or that the expansion in the walls of the pipe and compression of the fluid is sufficient to take the ripple out of the delivery.

QUESTION

Why are not rotary pumps used aboard ships more frequently?

ANSWER

For electric drive for auxiliaries, rotary pumps are very well fitted, as they match the rotative speeds of motors efficiently. For steam drive of auxiliaries, the small steam turbine spins too fast or must be geared to rotary pumps. And, of course, for simplicity a reciprocating pump would be used on a reciprocating steam engine.

Rotary pumps are used to a great extent on tankers as cargo pumps for loading, unloading or transferring cargo. Also they are used extensively in diesel engine rooms motor driven.

The trend appears to be toward a wider application of rotary pumps. Centrifugal pumps, however, will always hold the field for moderate pressures of water, particularly in large sizes and great volumes.

Our next article under this series on auxiliaries will cover vacuum pumps and ejectors.

Engineers' Licenses

The following list shows licenses granted during the month of January to engineer officers of the merchant marine at Pacific Coast offices of the Bureau of Marine Inspection and Navigation:

Name and Grade	Class	Condition
HONOLULU		
Cecil Charles Coleman, 2nd Asst. Eng.	OMS, any GT	O
Emmit N. Weatherley, 2nd Asst. Eng.	OSS, any GT	RG
PORTLAND		
Donald J. Sass, Chief Eng.	OMS, any GT	O
Martin Karney, 1st Asst. Eng.	OSS, any GT	RG
Raymond H. Robinson, 1st Asst. Eng.	OSS, any GT	RG
SAN FRANCISCO		
William Hornberger, 1st Asst. Eng.	OSS, any GT	RG
William H. Willard, 1st Asst. Eng.	OSS, any GT	RG
Vernon C. Christopher, 2nd Asst. Eng.	OSS, any GT	RG
Charles T. Ewell, 2nd Asst. Eng.	OSS, any GT	O
Harold N. Johansen, 2nd Asst. Eng.	OSS, any GT	O
Harry G. Reader, 2nd Asst. Eng.	OSS, any GT	O
Charles J. Duggan, 3d Asst. Eng.	OSS, any GT	O
William M. Jones, 3d Asst. Eng.	OSS, any GT	O
Franklin J. Hall, 3d Asst. Eng.	OSS, any GT	O
Christian M. L. Olsen, 3d Asst. Eng.	OSS, any GT	O
Clifford C. Brenneke, 3d Asst. Eng.	OSS, any GT	O
William O. Lockwood, Chief Eng.	OMS, any GT	O
Melvin J. Flinders, Chief Eng.	OMS, any GT	O
Adolph Johannesen, 1st Asst. Eng.	OMS, any GT	O
SAN PEDRO		
Sanford O. Peterson, 3d Asst. Eng.	OSS, any GT	O
Charles E. Pickard, 3d Asst. Eng.	OSS, any GT	O
SEATTLE		
John E. Karlsson, Chief Eng.	OSS, any GT	RG
Charles M. Wedding, 3d Asst. Eng.	OSS, any GT	O

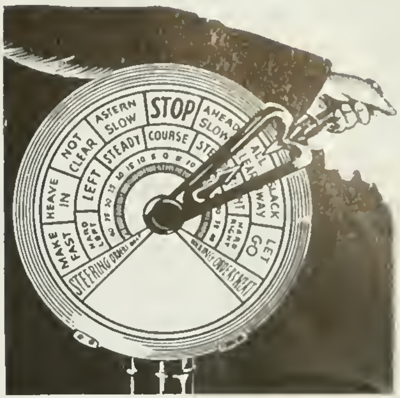
Abbreviations: GT is gross tonnage; RG is raised grade; O is original license; OSS is ocean steamer; OMS is ocean motorship.

Change of Masters

Steamer Maple: F. E. Trask; vice, C. W. Saunders, Jr.
Steamer Manoa: O. H. Morgan; vice, F. I. Hamma.
Steamer George L. Olsen: P. J. Johnson; vice, N. C. Ronberg.
Steamer Point Vincente: J. Tobiassen; vice, L. Larsen.
Steamer Point Lobos: Peter E. Odeen; vice, E. H. Phillips.
Steamer Manoa: Stephen G. King; vice, F. M. Graham.
Steamer Maliko: T. H. Cunningham; vice, Stephen G. King.
Steamer Florence Olson: Nels Spar; vice, P. O. Johnson.
Steamer Maunawili: B. V. White; vice, J. E. Dollard.
Steamer Hubert Schafer: Victor Jacobson; vice, P. W. Johnson.
Steamer Alabaman: F. H. Roberts; vice, E. J. Anderson.
Schooner Golden State: Martin Boers; vice, B. Luber.
Steamer Maliko: J. E. Dollard; vice, T. H. Cunningham.
Steamer Kahuku: T. H. Cunningham; vice, H. Speller.
Steamer Mauna Kea: L. G. Vick; vice, F. N. Troup.
Steamer Margaret Schafer: P. W. Johnson; vice, H. Berg.
Steamer Montanan: W. I. Stevens; vice. C. E. Nash.
Steamer Olpano: H. Speller; vice, C. H. Wichman.
Steamer Eureka: Max Blicath; vice, O. O. Blyglen.
Steamer Kansan: G. T. Gaidsick; vice, K. Hansen.
Steamer Point Estero: John P. Larsen; vice, C. Hunter.

Steady as you go!

KNOWLEDGE IS THE STRAIGHT COURSE TO ADVANCEMENT



A DEPARTMENT FOR DECK OFFICERS

AIR-BORNE DAMAGE TO SEA-BORNE CARGOES

IV - MISCELLANEOUS DAMAGE

By OLIVER D. COLVIN, WERNER H. E. HAHNE and MARK R. COLBY

The corrosion of steel and other metals has been studied very intensely during the last several decades and the scientific principles involved in it are fairly well understood. It is believed that most corrosion of metals is due to electrolytic activity between two different metals and an aqueous electrolytic conductor. The water may be rain, containing metal salts or atmospheric carbon dioxide, etc. Minute galvanic currents are set up, for instance, between two galvanized sheets with the result that a fluffy white compound oxide is formed between the sheets. The sheets themselves are more or less corroded with white rust on the surface, but in due time the layer of zinc may become pitted and the sheets practically valueless. All galvanized products are likely to become damaged by contact with other metal in the presence of water, because zinc is electronegative to steel.

Tin, on the other hand, is electropositive to steel. Therefore, the smallest perforation in a coating of tin will inevitably and rapidly attack the underlying steel, in the presence of water. Unfortunately, metallurgy today cannot produce commercially a perfectly continuous tin coating over sheet steel, such as is used for tin cans. The tin coating of most types of cans is cut and broken near the rims, with the result that a brief exposure of the tin cans to condensed moisture or other water will start the rusting of the steel.

Electrolytic corrosion does not necessarily require different metals or alloys. It is well known that every casting and plate, for instance of steel, consists of small crystals which are by no means uniform in composition. The difference between such crystals is sufficient electrolytically to promote pitting of steel plates in contact with water. This can frequently be observed on the underwater plating of ships. **It should be noted that water is essential for all of these processes.**

● Tainting and Staining

Cargo may become tainted and stained by moisture, gases, odors, fumes, smoke and vapors. Tainting is especially harmful to food products which are rendered unsalable, such as flour tainted by creosote. The chemistry of tainting by odors is but little understood in view of the extremely small amounts of substance involved.

Staining is often caused by dripping water or by fumes, such as the effect of sulphurous fumes from vulcanized rubber on silk, or the effect of acetic and tannic acid fumes from green lumber on nail kegs, etc. In one case a shipment of tractors which were painted blue had turned bright yellow, due to the presence of some unknown fume, possibly aniline, present in the cargo holds.

Much tainting and staining is caused by smoke during a fire in the cargo. Smokes are the products of dry distillation of organic materials, usually of a tarry nature and with very penetrating and persistent odors.

Damage by gases is less common in cargo holds unless leaky containers of ammonia, chlorine, etc., should be present. Most of the common gases are odorless and comparatively inactive chemically. Under this heading may be mentioned the staining of fresh fruit in the presence of too much carbon dioxide. Fresh fruit is a living organism and respires as such. If the products of respiration accumulate, due to poor aeration above a certain percentage, the fruit suffocates and the result is the so-called "Brown Heart."

● Activity of Bacteria and Fungi

One particularly troublesome activity of bacteria is molding. Some mold bacteria feed on the particular substance but require moisture and oxygen for their existence. Experiments recently carried out abroad indicate that mold bacteria cannot exist in air with a relative humidity below about 80 per cent. The mold does damage by actually destroying some of the substance. In products made of Douglas fir, certain molds cause the so-called "Bluestain." Spruce, which is much used in aeroplane construction, is likely to be affected by a fungus, which penetrates deeply into the material. It is claimed that a piece of spruce once infected will again get moldy later on whenever it is exposed to damp air. In grain, skins and many other organic materials mold will assist in creating rank and harmful odors, which are likely to taint other cargo.

● Vermin and Fumigation

In addition to deterioration of cargo by moisture, oxygen, other chemicals, heat and bacteria, there are numerous rodents and insects feeding on and damaging many cargoes. Most harmful among vermin are rats, mice, white ants, grain moths, cloth moths and a number of bugs and larvae. Rats are doubly harmful because they are also carriers of virulent diseases. The damage is done partly by direct consumption of the goods. But the indirect damage done by vermin is often very much greater; for instance, by destroying containers and bags, by contaminating and staining adjacent cargo. Special attention should be paid to grains and seeds of all kinds, rags, dunnage wood, bamboo, animal horns, bones and skins.

Vermin of this kind, including bacteria, can be successfully attacked by means of poisonous gases, such as hydrocyanic acid, if properly administered. This gas can be bought on the market in the form of a liquid in small cylinders, or in several other commercial forms. The gas has a faint almond-like odor and is slightly lighter than atmospheric air of the same temperature. It is also violently poisonous to human beings and has caused many accidental deaths due to the fact that it was not completely removed from the cargo holds after a fumigation.

These gases can kill effectively only if they get in intimate contact with the pest, by way of their breathing organs. Some insects are dormant at low temperatures, which makes fumigation of little effect. Therefore, fumigation should be done in warm weather or with warm cargo; or other gases, such as carbon dioxide or tear gas, have to be mixed with the fumigants to induce the pests to breathe more quickly.

Numerous rules and instructions have been issued by authorities all over the world to insure an efficient destruction of vermin, and the protection of human life.

● Temperature and Humidity Readings

We have seen that the atmospheric and seawater conditions surrounding a cargo ship have a great bearing on the safe carriage of cargoes. Cargo may absorb moisture from humid air, cargo may give off a great deal of moisture or heat to the atmosphere, moisture from the atmosphere may condense on the cargo, or moisture from the cargo may condense on the inside surface of the cargo holds.

Therefore, it is of importance for a captain to know these conditions during the entire voyage. Temperature records of sea water and atmosphere are taken on most ships; so are the direction and velocity of the wind. The relative humidity of the atmosphere, or the dew point, which is equally important, is not regularly taken except on a few progressive ships.

A few words should be said here on the taking of temperature and humidity readings. This matter has been studied carefully by the Research Committee on Marine Moisture Damage, Vancouver, British Columbia, and the results have been published in a handy form in their Bulletin Number 3, "Temperature and Humidity Instruments." (8) There is a wide range of suitable instruments, but the number and type used will be governed largely by the nature of the installation and the funds available. No attempt will be made here to outline in detail these different instruments; the types recommended for use on board ship will be merely noted, as follows:

(a) Thermometers.
  Direct indicating or recording types.
    Mercury bulb.
    Bi-metallic dial.
    Bourdon tube.
(b) Distant indicating or recording.
  Mercury bulb and capillary tubing.
  Vapor bulb and capillary tubing.
  Bourdon tube and synchronous electric transmission.
(c) Humidity indicators. Hair element.

The dew point of air may be obtained by three different methods:

(a) Directly by dew-point indicators.

(b) Indirectly by relative humidity indicator, thermometer and psychrometric chart, or Chart 1A.

(c) Indirectly by wet and dry bulb thermometer and psychrometric chart.

There is at present no direct dew-point indicator available which is practical for use on board ship. Among the relative humidity indicators the human hair type has proved to be the most reliable and practical. The readings obtained by these may be transmitted electrically over the length of a ship.

The wet and dry bulb thermometers may be of the local or the distant transmitting type. The readings obtained with these instruments are accurate, provided the wet bulb is kept in proper condition. Therefore, this type of instrument is not recommended for distant indication of conditions in cargo spaces.

● Determining Moisture Content of Cargoes

A number of methods have been worked out for determining the moisture content of different products. Most of these can be made only by expert chemists with the proper laboratory equipment.

An exception is the measurement of moisture in grain. This can very quickly and reliably be made with instruments based on the electric resistance method. Instruments based on the same principle have also been developed for the measurement of moisture in thin pieces of lumber.

Another method of determining the moisture content of materials has been suggested recently. A substantial sample of the material under question is stowed in a closed container. The relative humidity or dew point of the enclosed air is taken after the temperature in and outside the container have become equalized. By means of the moisture equilibrium diagram, the moisure content of the substance is then obtained.

At times it may be of importance to take other readings in cargo holds or on deck, such as velocity and direction of air currents, content of foreign materials or gases. A description of methods of determining these exceeds the scope of this paper and students of these matters are referred to specialized literature.

• Maritime Meteorology

Another factor that is of importance in carrying cargo is the rate of temperature change occurring during ocean voyages. Rapid temperature changes in atmosphere or sea water are very conducive to condensation and subsequent moisture damage to cargo. On some ocean routes temperatures may rise or fall more than 30 degrees in a few hours. It is therefore suggested that during such periods the temperatures of the atmosphere and sea water be taken more frequently; for instance, every hour, instead of only every four hours.

Zones of extreme temperature changes occur at different places on the earth, and are often caused by ocean currents of different temperatures or by the neighborhood of large continents. The difference between temperatures of ocean currents is least in the warm and greatest in the cold season of the region in question. This is due to the fact that the temperature of cold currents varies somewhat with the seasons, while the tropical currents do not. Away from large continents the temperature of the atmosphere follows that of the sea-water temperature within about 10 degrees. Near large land areas the temperature of land winds may deviate greatly from the sea-water temperature. Thus a ship may sail in cold water with a warm wind overhead (such as the Mississippi Delta during winter time), or sail in warm water with a cold wind overhead. In either case fog is likely to be present.

On the United States and Canadian intercoastal routes a very extreme temperature change occurs south of Cape Hatteras in winter time, where the warm Gulf stream meets the cold Labrador current. There the temperature may change as much as 40 degrees within eight hours. On the Pacific side a change not quite as extreme occurs off the coast of lower California where the cold Humboldt current meets the tropical counter-current. Other notable changes occur, for instance, on the North Pacific route, off the North Japanese Islands, where the warm Japanese current borders on the cold arctic current; on the South Africa route off Cape Town, where the warm Agulhas current meets the antarctic drift; on the North Atlantic route off Newfoundland, where the Gulf stream borders the Labrador current; and on the east coast South American route, off the coast of Uruguay, where the cold Falkland and the warm Brazil currents meet. A very extreme temperature change, extending over a period of but a few days, is experienced on the route between Vladivostok and the hot Oriental countries.

It should be noted that all of these major temperature changes are well known to the mariner and can be obtained from nautical charts.

It is obvious that a clear-cut decision on a particular damage case can be made only when the essential data as to moisture content of cargo, temperature, etc., are known. The study of numerous decisions on damage cases shows that the transportation of nearly all cargoes, involving an enormous sum of money, is carried out without any consideration of such vital information.

Deck Officers' Licenses

The following list shows licenses granted during the month of January to deck officers of the merchant marine at Pacific Coast offices of the Bureau of Marine Inspection and Navigation:

Name and Grade	Class	Condition
JUNEAU		
Arne Monson, Master; 1st Class Pilot	OSS & OMS, any GT	O
John E. Clark, Chief Mate	OSS & OMS, any GT	O
SAN FRANCISCO		
William C. Kasmire, Master	OSS, any GT	O
Frederick T. Hawkesworth, Master	OSS, any GT	RG
William H. Brooke, Master	OSS, any GT	RG
Charles Kirkbak, Master	OSS, any GT	RG
Arvid Young, Chief Mate	OSS, any GT	RG
Martin Froyland, Chief Mate	OSS, any GT	RG
Murdock M. Maxwell, 2nd Mate	OSS, any GT	O
Reginald Atthowe, Jr., 2nd Mate	OSS, any GT	RG
Erhard Rostlund, 2nd Mate	OSS, any GT	RG
Edwin L. Solem, 2nd Mate	OSS, any GT	RG
Clyde M. Parker, 2nd Mate	OSS, any GT	RG
Stanley S. Wilk, 3d Mate	OSS, any GT	O
Richard Barry, 3d Mate	OSS, any GT	O
Arthur G. Morriss, 3d Mate	OSS, any GT	O
SAN PEDRO		
Ira H. Galtry, 2nd Mate	OSS, any GT	O
Harry A. Johnson, 2nd Mate	OSS, any GT	RG
Donald R. De Spain, 3d Mate	OSS, any GT	O
Russell R. Jones, 3d Mate	OSS, any GT	O
SEATTLE		
John N. Andersson, Master & Pilot	OSS, any GT	RG
Albert C. Meyer, Master	OSS, any GT	RG
Frank I. Huxtable, 2nd Mate	OSS, any GT	RG
Gurvis C. Johnson, 2nd Mate	OSS, any GT	RG
Kenneth W. Corbin, 3d Mate	OSS, any GT	O
George E. Thuesen, Jr., 3d Mate	OSS, any GT	O

Abbreviations: GT is gross tonnage; RG is raised grade; O is original license; OSS is ocean steamer; OMS is ocean motorship.

Launch of Traverse City Socony.

A Remarkable Tanker Constructio

Great Lakes Tank

The Traverse City Socony, built by the Manitowoc Shipbuilding Company of Manitowoc, Wisconsin, for the Great Lakes services of the Socony Vacuum Oil Company, is a rather remarkable example of constructive cooperation between owner, designer, builder and subcontractors in producing a satisfactory and economical bulk oil carrier in a very short space of time.

Her keel was laid on February 15, 1938; she was launched on June 9, 1938; delivered late in July, 1938; and before the close of navigation, December 15, 1938, she had made 33 trips covering 14,951 miles.

Her general characteristics are:

Length overall	290′
Length B. P.	280′ 4″
Beam	49′ 6″
Depth	20′ 6″
Gross measurement	2031.55 tons
Net measurement	1215 tons
Displacement, light	1400 tons
Draft (Summer load line)	17′ 2″
Deadweight (at draft)	5170 tons
Cargo tanks	12
Gasoline capacity	1,209,372 gals.
Fuel capacity	25,915 gals.
Speed (cruising)	12.5 m.p.h.
Fuel consumption at speed	100 g.p.h.

Traverse City Socony was designed by the Socony Vacuum Oil Company. Her hull design is on the longitudinal system of framing, especially adapted to the electric welding of large sub-assemblies, which could be fabricated and assembled inside the shop in winter and erected on the building ways to form the finished hull. It was this feature of the design that made possible the remarkable construction record.

In this method the hull was composed of a series of panels assembled in the shop by welding and erected on the ways and welded into the complete hull. These panels comprised: the keel and keelson; bottom port; bottom starboard; side port; side starboard; deck port; deck starboard; center line bulkhead; rider plate and top centerline strake; transverse bulkheads port; and transverse bulkheads starboard. The bilge strake plates were welded in separately in the erection on the ways. Bow and stern assemblies were partly riveted.

Approved covered electrodes were specified for all welding. Nearly 100,000 feet of welding seams were necessary for the assembly and erection of the approximately 1,000 tons of steel that forms the completed hull.

Motor tanker Traverse City Socony running 12 m.p.h. on her regular Lake Michigan run.

Propulsion Plant

Traverse City Socony is propelled by twin screws, each of which is driven by a six cylinder, 4 cycle, directly reversible trunk piston type Nordberg diesel engine. Each of these engines develops 750 brake horsepower at 300 r.p.m. Each cylinder is 16-inch bore and 22-inch stroke, and takes fuel on mechanical injection. A complete description of

ecord

raverse City Socony

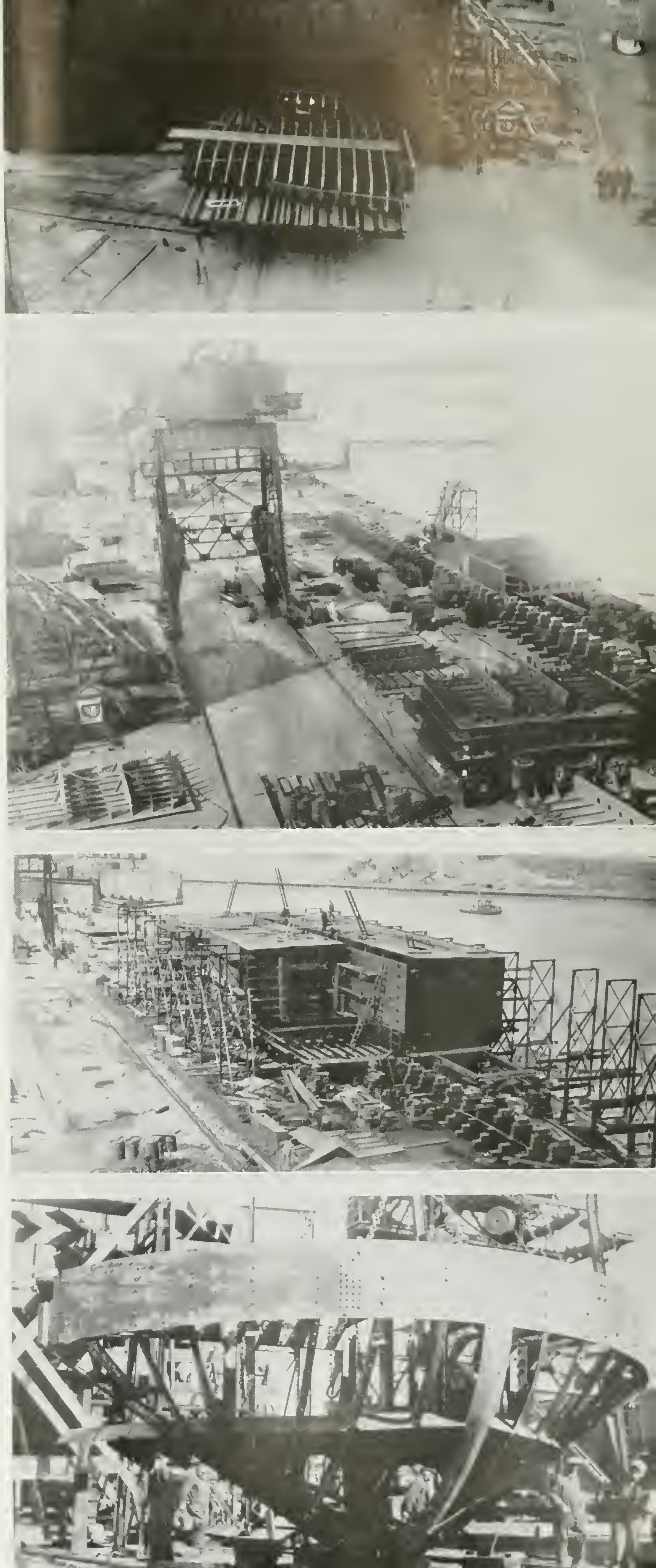
the engines will be found in Pacific Marine Review for September, 1938.

Power for electric auxiliaries and lighting, and for the cargo pumps, is provided by two Fairbanks-Morse 8 cylinder, 4 cycle diesel engines developing 120 H.P. each at 900 r.p.m. Each of these engines is directly connected to a 70 K.W. direct current generator and through a clutch and a bulkhead stuffing tube to a Northern Pump Co. rotary cargo pump with a capacity for discharging 1460 gallons per minute. With both pumps in operation a full cargo can be discharged in approximately seven hours.

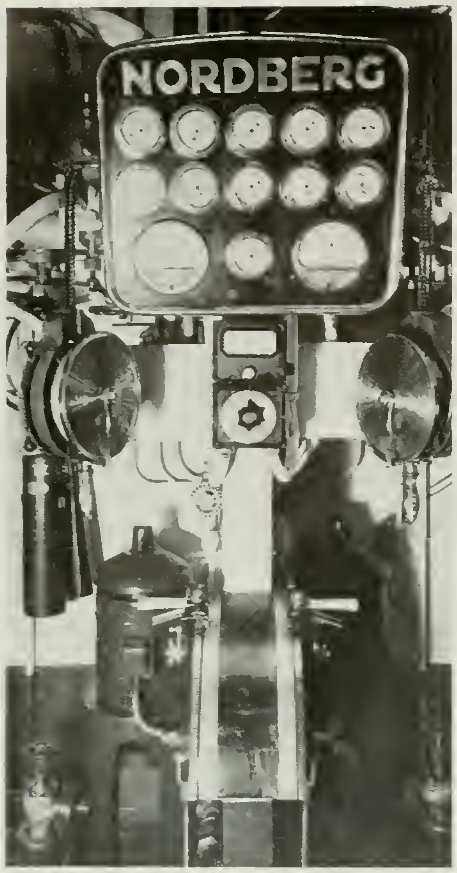
All service equipment, and practically all auxiliary machinery, both deck and engine room, are electrically driven. Motors for the deck machinery and steering gear are of the Diehl waterproof type. Diehl Manufacturing Company also supplied a 25 H.P. explosion proof and waterproof motor for the ballast pump. Motors for engine room auxiliaries are chiefly of Fairbanks-Morse make.

The bridge and pilot house are equipped with the most modern navigation equipment and safety control devices. Cargo spaces, pump room, and engine room are protected by a Lux carbon dioxide system.

Commodious crews' quarters



Progress of construction: Top, down: subassemblies leaving shop; erecting assemblies on ways; several cargo tanks in place; and stern assembly ready to be placed.



Traverse City Socony is powered with two Nordberg six cylinder 750 B.H.P. diesels like that shown below. Controls for both these engines are centralized at the station shown at left.

fitted in the poop are: insulated; fireproofed; fitted for hot and cold running water and steam heat; furnished with especially designed metal furniture; equipped with showers; and provided with ample electric outlets for lights, radio, fans and shaving.

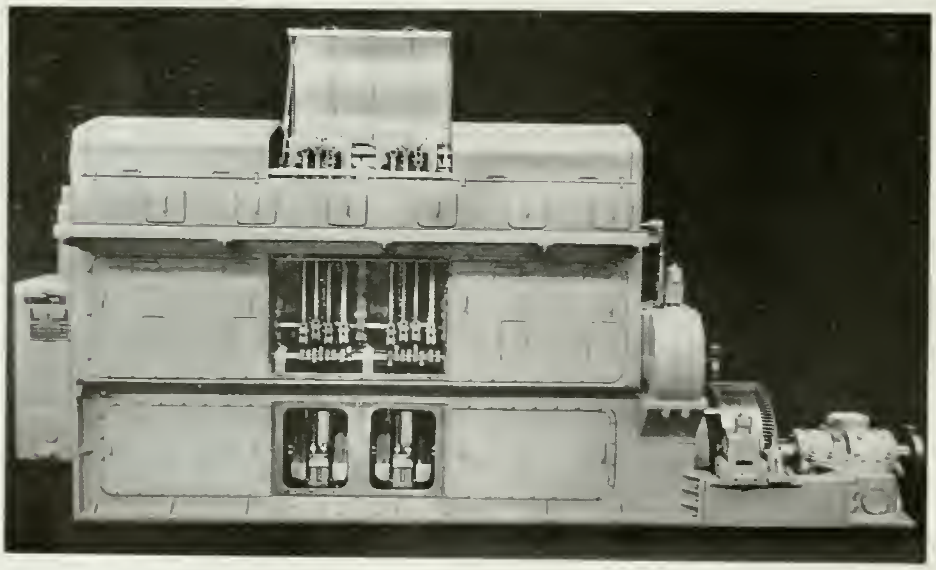
Performance

The Traverse City Socony on delivery was immediately put into service to various lake ports out of her owners' plant in East Chicago.

Before the close of navigation on December 15 she had made 33 trips, covering 14,951 miles at an average speed for the entire distance of 11.9 miles per hour. All types of weather were encountered during these trips. No delay or trouble of any kind was experienced. The main engines performed very satisfactorily and the fuel economy was equal to the expectations of the owners.

To fabricate, assemble, and equip such a tanker and have that tanker satisfactorily complete 33 trips, all within 10 months, is, we repeat, a very remarkable example of constructive cooperation between all the parties concerned.

The Nordberg engines are direct connected and directly reversible. The entire control of speed and of reversing is in the two hand levers shown in the upper illustration.



Control Boards For Marine Use

Group type controllers of the dead front type for centralized control of auxiliary motors, for the first time factory-assembled, are being prepared for shipboard use by the Westinghouse Electric & Manufacturing Company.

Each controller of the group consists of one-inch thick ebony asbestos lumber panel with the necessary contactors and relays on the front and the starting resistors, buses and terminals at the rear.

Circuits are protected by 2-pole "De-ion" circuit breakers with overload and short circuit trip. For each motor circuit a start-stop pushbutton station is supplied, and additional pushbuttons may be installed near each auxiliary.

Wiring from each unit controller ends on the terminal board near the bottom of the panels, facilitating convenient connections to the outgoing cables.

The control panels are protected by stretcher leveled sheet steel, hinged to give access to the controls. The "De-ion" breakers are raised from the control boards, the handles extending through openings in the steel panels to permit easy operation.

This form of construction is designed to make the dead front type of control equipment attractive, convenient and reliable.

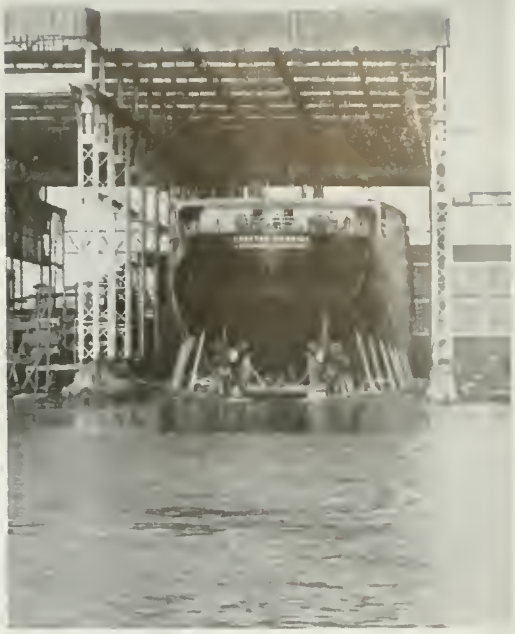
U. S. Lines Agent For Pan America

In anticipation of a transatlantic service of giant flying ships soon to be inaugurated, Pan American Airways on February 11 designated the United States Lines as its European general agent. This appointment also applies to all other services of this vast air transportation system, including its South American and transpacific services. It covers Great Britain, Irish Free State, the major part of France, Belgium, Scandinavia, Switzerland, Netherlands, Germany, Hungary, Czechoslovakia, and other central European countries.

U. S. Engineers Diesel Drive Dredge

By E. A. HODGE

Marine Manager, Pusey & Jones Corporation



Dredge Chester Harding on ways just before launching

Laid down in May, 1938, and launched on January 20, 1939, the United States Engineer Department's latest all-diesel seagoing hopper dredge Chester Harding is nearing completion at the shipyards of the Pusey & Jones Corporation, where she will be outfitted for delivery next spring as the 17th steel ship to be built for the War Department by that firm since the first one was constructed for the Quartermaster General at Wilmington, Delaware, in 1871.

This new 4,000-ton steel ship is named after the late Brigadier General Chester Harding, Governor of the Panama Canal from 1916 to 1920; she is of riveted construction, 308 feet long, 56 feet beam, with a load draft of 20 feet, and has a hopper capacity of 2500 cubic yards. When loaded she will displace 7,000 tons.

She is powered with two 1,000 B.H.P. solid injection direct-reversing Busch-Sulzer 8-cylinder four cycle diesel engines, directly connected to the propeller shafts and installed in an engine room located amidships. An adjacent machinery space, separated from the engine room by a watertight bulkhead, contains the dredge pump machinery, consisting of two 22" centrifugal pumps, each driven by 650 B.H.P., 6-cylinder Cooper-Bessemer diesel engines of the solid-injection, non-reversing type, positioned athwartship with connected and independent auxiliaries so located as to allow ample free space and headroom. These engines turn the pumps at 250 r.p.m.

Electric power is furnished by a 400 KW, 250 volt, direct current, Westinghouse generator coupled to a third Cooper-Bessemer diesel engine of the 8-cylinder type, equipped for solid injection and rated at 600 B.H.P. at 450 r.p.m. A 75 KW stand-by generator of Buda manufacture will supply 250 volt current for port use. All diesel machinery is cooled by a common closed water circulation system having heat exchangers capable of 5,550,000 B.T.U. heat transfer per hour. Three 10 H.P. electric powered Nash centrifugal pumps are selectively arranged in this system for lifting fresh water from the engine room double bottom tanks and circulating it through the several engine jackets, heat exchangers and oil coolers.

Dredge Chester Harding in the stream after launching

● Engine Room and Controls

The main engines represent the initial attempt of the U. S. Engineering Department to provide direct diesel drive propulsion in a seagoing dredge, and shop trials point to the successful low speed operation initially anticipated by Hugo Haas, senior engineer, who is responsible for the ship's machinery design conception. At full power, the main engines will turn the 7'-8" diameter, four bladed propellers 250 revolutions per minute, which should offer excellent maneuverability as well as low fuel consumption. The shipbuilder has developed a unique control station, which, besides offering a remote hydraulic control for the propelling engines, centralizes the instruments for all four engine room diesels on a series of indirectly illuminated panels arranged in planes perpendicular to the operator's vision in the middle of the station. The repeaters, telephones, loud speaker and air controls are also concentrated within easy reach of the operator and the entire station is designed in the modern simplicity motif, decorated with stainless steel and having double built-in log desks.

- **Dredge and Hopper Controls**

There are eight cast steel hopper doors in the ship's bottom, four forward of the machinery spaces and four aft, all operated by a hydraulic system at 300 pounds normal working pressure per square inch through individual hand controls in way of each cylinder, accessible from cat-walks over the hoppers immediately above the upper deck level. A drag pipe is suspended from two special davits fitted on each side of the hull with provision for raising and lowering through two 85 H.P. electric powered double drum winches that are controlled remotely from the drag tenders' houses built-in under the bridge. Winch speed and rotation are governed by varying the direction and intensity of the field current in a 150 K.W. motor generator set located on the main deck.

All other deck machinery, such as derrick winches, boat winches, steering gear and anchor windlass, are electrically driven; being the product of the American Engineering Company. The foremast and mainmast are rigged for handling deck gear. Kingposts abreast the midship house are designed for lifting the heavy pump machinery and drag parts. MacLachlan davits of the latest type are employed for boat handling.

- **Crews' Quarters**

The ship's crew, consisting of 56 men and 10 officers, will be quartered in ultra-modern fire-proof accommodations having paneled deckheads and bulkheads and outfitted with steel mahogany finished furniture. Interior doors are metal framed, hollow, mahogany finished steel. The exterior doors of the superstructure are flush paneled mahogany and the window sash and venetian blinds are of the same material.

- **Bridge Equipment**

Designed in streamlined form, the bridge overhangs to ship's side, port and starboard, curving forward at the centerline, and is entirely enclosed by some sixty brass-framed Kearfott windows, front and back, arranged to offer 100 per cent unobstructed vision. The enclosure is formed into an all-steel wheel house and chart room at the back of the bridge, which is equipped with the most up-to-date navigating and inter-communicating system, including a radio direction finder, electric steering stand, gyro compass, Guided Radio loud speaker talk-back system, remotely controlled 1000 watt, 18″ searchlights, automatic draft indicators, fathometer and hydraulically controlled watertight door system.

The stack is streamlined, decorated with stainless steel banding and a stainless steel U. S. Engineer Department emblem, representative of a modern trend in design smartness, contributed by the shipbuilder.

- **Electrical Installation**

The electrical installation conforms to the rigid, high quality standard of the Engineer Corps and is centralized in the engine room in a dead front Walker switchboard, provided with detachable circuit breakers and flush-mounted instruments. All power circuits are energized at 250 volts direct current. Illumination is energized at 115 volts, through balancer sets.

The light fixtures have been specially designed by the shipyard to suit the steel-faced plywood panels and spot-welded joiner sections, which will be finished in baked ivory color commensurate with the scientifically developed indirect lighting which concentrates a downward daylight beam for reading.

The plans of the ship indicate that she will be a handsome craft with smart lines and substantial seagoing qualities. She is being built to the highest American Bureau Classification Rules and will be certified upon completion by the U. S. Bureau of Marine Inspection and Navigation prior to delivery at New York for dredging service. The ship will cost $1,800,000.

Rescue of Seaplane Proves Value of Auto Alarms

The Federal Communications Commission has issued a report on the part radio played in the rescue of the ten persons saved from the British Seaplane Cavalier when it sank with the loss of three lives in the Atlantic Ocean on January 21.

While radio plays a daily role in the safety of life at sea and in the air, the rescue work in the Cavalier disaster was of outstanding significance in that it proved the value of auto alarms, which the Commission in 1937 ordered placed on all cargo vessels over 1600 gross tons navigating the ocean. It was this auto alarm, sounding off like a fire gong, which attracted the attention of A. R. Hamilton, radio operator aboard the Standard Oil tanker Esso Baytown and thus set in motion the events which led to the ship's rescue of the ten survivors. Hamilton, the only operator on the vessel, was not on watch and was busy elsewhere on the ship at the time the alarm bell responded to the international auto alarm signal transmitted by a powerful coastal station on Long Island.

The auto alarm consists of a radio receiver, selector mechanism, and two sets of bells, one of which is located in the operator's sleeping quarters and one on the bridge, and when actuated by the auto alarm signal summons the operator to the radio room in time to intercept a distress message. The Cavalier had maintained constant contact with the Pan American Airways radio station at Port Washington, Long Island. When two motors on the big four motored seaplane cut out, Captain Alderson ordered radio operator Harry Chapman to send out the signal PAN, which is the international emergency signal for aircraft. Immediately after this the other two motors quit and Chapman radioed an SOS giving his position. Both of these messages were picked up by the Pan American Airways station at Port Washington (WAQI) and this station immediately notified the coastal stations in the New York area, which at once broadcast the auto alarm signal, the SOS and the position of the ship. Mackay Radio Coastal Station, WSL, at Amagansett, Long Island,

(Page 41, please)

Notes on European Shipping

Proposals for Aids to British Shipping

Last July, at the suggestion of the Board of Trade, a number of committees representing the British shipping industry began an exhaustive review of world conditions facing British shipping, and the formulation, based on such review, of proposals for Government aid. These proposals have now been coordinated by the Joint Shipping Policy Committee of the Liverpool Steamship Owners Association and the Chamber of Commerce of the United Kingdom, and are being submitted to the British Government.

Briefly summarized, the main proposals include:

(1) Deep Sea Tramp Shipping.—Subsidy to be renewed generally on 1934-36 basis, but to a total of £2,500,000 per annum and for a minimum of five years. Conditions of subsidy entail compliance with minimum freight scale and compliance with National Maritime Board agreements when applicable. Subsidy to be suspended whenever freights reach a certain level.

(2) Deep Sea and Near Trades Liners.—A sum of £5,000,000 per annum to be voted to a Liner Defense Fund (as distinct from a subsidy). This Fund would be administered by the Treasury on the advice of an independent committee. When a line or group of lines in a particular trade is threatened, especially by foreign subsidized competition, it should be able to obtain immediate assistance from the Fund. The special Commission should also investigate means of assisting liners through trade treaties, etc.

(3) Near Continental Trades.—The small, handy vessels of these trades represent a very vital part of our defense forces in time of war, and too little attention has been paid to them. They have declined seriously since the war. Scope for recovery lies largely in the Baltic timber trade, whence British vessels have been driven out by others not so hampered by regulations relating to deck cargoes. The Government is asked to insist that a definite and increasing proportion of our timber imports be carried in British ships, and to vote a subsidy of £500,000 per annum for five years under approximately the same conditions as the Tramp Shipping Subsidy.

(4) Coasting Tramp Shipping.—A subsidy of £500,000 a year for five years should be awarded on similar conditions as above. The Government also to secure fair competition between the railways and shipping, and to insist that municipal and other public authorities employ British ships for the carriage of their goods. Finally, that the same regulations regarding safety, etc., should be applied to foreign ships on the coast as to British.

(5 Coasting Liners.—The greatest need here is for effective co-ordination between railways, road haulers, canal undertakings and coastal shipping.

(6) Tankers.—A large fleet of tankers for use in emergency is essential. British tramp tankers are likely to disappear in time in face of competition by cheaply run Scandinavian ships. Even with the assistance of the tanker pool, British owners cannot earn sufficient to cover their depreciation. It is felt that nothing can be done without first discussing the matter with the Government, but in the meantime it is hoped that the Admiralty will, instead of replacing old tankers in its service, charter British privately-owned tonnage for its requirements.

The letter of transmission strongly emphasized the fact that, in addition to these concrete proposals for direct aid, the enormous purchasing power of Great Britain and the resources of the British Empire form a very powerful lever for the Government to use for the benefit of British shipping in its international negotiations.

Progress in Marine Radio

For many years radio equipment of ships was almost entirely governed by the compulsory regulations of the various maritime countries, applied in the interests of safety of life. There is now, however, a strong and growing movement to equip ships to an even greater extent than the regulations demand. This tendency arises primarily from appreciation of the fact that radio, quite apart from its "safety of life" aspect, can provide valuable assistance to the navigator: and it is significant that practically every new deep-sea ship is now fitted as a matter of course with a radio direction finder, irrespective of whether or not her tonnage or service is such as to bring such fitting within the compulsory regulations. Moreover, on many of the large passenger liners, the radio direction finder is regularly operated by the navigating officer as part of his normal duties rather than by the radio staff. The same tendency appears in the case of the "voluntarily equipped" class of vessel, such as the trawler or the small coasting vessel, which, in addition to being fitted with the skipper-operated radiotelephone equipment, already accepted as a commercial necessity, now frequently has a direction finder as well. Progress in this direction has been greatly stimulated in recent years by the growth of the extensive system of radio beacons, over three hundred in number, serving European and North American waters.

The radio equipment for the new Cunard - White Star super - liner Queen Elizabeth will be provided and installed by the International Marine Radio Company, Ltd., of London, an associated company of the International Telephone and Telegraph Corporation, the suppliers of corresponding equipment

(Page 41, please)

New Factory for Marine Sheathing and Marinite

Following closely upon the announcement made only two months ago that Johns-Manville is opening three new plants to be in operation by the early part of this year, Lewis H. Brown, J-M president, has announced the establishment of a fourth new unit at North Billerica, Mass. (near Lowell), for the manufacture of Marinite and Marine Sheathing, two fireproof panel materials used in modern ship construction.

The new factory, on which Johns-Manville has signed a long-term lease, is located in the former carshops of the Boston & Maine Railroad. The space was vacated when the railroad transferred this phase of its car repair activities to Concord, N. H., and machinery is now being installed for the production of Marinite and Marine Sheathing. The factory has a floor space of 109,400 square feet—about two and a half acres—and will employ an initial force of between 75 and 100 men.

The initial force to be employed at North Billerica is relatively small in comparison with that of some of the other J-M manufacturing units, but it is pointed out that the two materials to be manufactured at this location have great potentialities for expansion.

Both Marinite and Marine Sheathing were originally developed by the Johns-Manville Research Laboratories in answer to the quest for fire safety on shipboard. Made by combining asbestos fiber with an inorganic binder under heavy pressure, they are both homogeneous sheet materials that cannot burn and do not disintegrate under soaking moisture. Manufactured in the form of strong, light-weight panels, they are designed especially for use in building passenger quarters on shipboard. They offer an incombustible barrier to flames and possess insulating properties that prevent any excessive temperature rise which might result in the spread of fire in adjoining compartments.

Marinite's light weight—only 2.7 pounds to the square foot in the ¾-inch thickness—makes it desirable for many marine uses such as partition bulkheads between rooms and for passageways, outboard sheathings and linings, insulating ceilings, and as fire screen bulkhead protection. The material has good tensile strength and screw-holding power, affords sound privacy in staterooms, and is adaptable to a diversity of decorative treatments. The panels can be painted or covered with a wood veneer or finished on one or both sides with plain or stainless steel or aluminum. One of the latest finishes is wood veneer bonded to light steel, the composite facing being cemented to the Marinite.

A ¾-inch thickness of Marinite meets the Government requirements limiting the temperature rise through Class B bulkhead panels, and has a two-hour rating for integrity of structure under heat tests reaching 1,850 degrees Fahrenheit.

Marine Sheathing, which is formed in the same manner as Marinite from asbestos fiber with an inorganic binder, is similar to it in appearance but is heavier and stronger. A one-inch thickness of it passes the official fire test for Class B bulkheads.

The first passenger-carrying vessel to use these new incombustible products was the S. S. Catherine, which was reconstructed in 1936 for the A. H. Bull Steamship Company. Later these materials were utilized aboard the S. S. Matsonia, on many oil tankers, on ore carriers and a number of cargo ships. More recently they have been embodied in specifications for the new passenger liner America, for three vessels of the Mississippi Steamship Company, and for a number of prospective ships for the U. S. Maritime Commission.

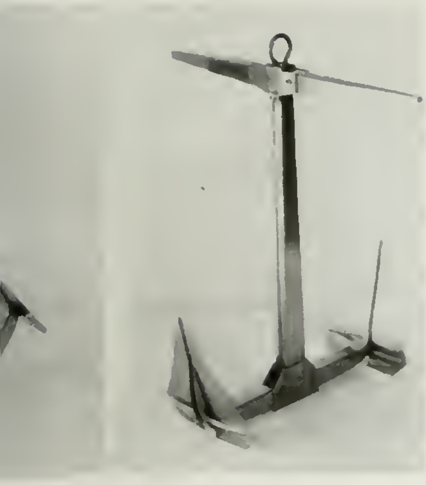
As a result of Marinite's satisfactory service on shipboard, Johns-Manville is now adapting the material for use as an insulating material in industrial plants, and for fireproofing structural steel in oil refineries and chemical plants. As an insulating material it is suitable for use up to 900 degrees F., being adaptable for service in ovens, glass lehrs, water and air cooled boiler walls and other industrial applications.

Better Living Through Chemistry

The du Pont exhibit at the Golden Gate International Expositoin gives the company an opportunity to bring to the West Coast for the first time a complete picture of its diversified activities carried on through seventy-eight plants in twenty-seven states. The products of its factories at Tacoma, Washington; El Monte, California; and South San Francisco, California; are featured, together with the story of how du Pont has contributed to the development of the West and what the West in turn means to this diversified national manufacturer.

The exhibit takes the form of a "building within a building" and occupies approximately 6,500 square feet of space in the Homes and Gardens Palace.

As the visitor enters the exhibit he sees a large chemical tower made up of oversized laboratory apparatus with a maze of bulbs and spiral tubing, inside of which liquids boil and churn and lights flash. On a wall surface behind the tower of research is being mounted a large mural, composed entirely of chemically-created materials, which dramatizes in a pictorial way how the chemist takes products of mine, forest and field and converts them into products better suited to man's needs. Inside the exhibit a variety of colorful displays representative of the company's research developments are mounted on set-back platforms. Behind the platform, which extends entirely around the exhibit, is a catwalk on which a group of young college men recruited from local universities stand and relate the stories behind the various chemical achievements displayed.



New Light-Weight Anchor

One of the latest developments in he marine accessory field introluced at the recent motorboat show n New York is a new light-weight nchor fabricated from high strength nonel sheet. It is welded throughout, except where the arms and tock meet the shank. These joints re pinned so that the anchor can e folded for stowing when not in se.

Made in a variety of sizes from 6 pounds to 47 pounds in weight, the anchor is so designed that the 11 pound size will hold a boat 38 feet in length. With the conventional type of anchor the general rule is to allow one pound to two pounds in anchor weight for each foot of boat length. This lightness of weight is made possible by the design of the anchor combined with the inherent strength of monel.

Arms of the unit are set at right angles to the stock and are equipped with a set of sharp-pointed triangular flukes. These dig deeper and deeper as the pull of the craft is increased. The broad palms of the anchor, which will bury itself completely in bottoms of clay or sand, provide an exceptionally strong grip. The anchor will not dig itself out of the bottom until a direct upward pull is exerted on the line. Then the sharp-pointed flukes readily cut their way out.

The light weight and small size of the anchor permit ease of handling and reduce the danger of damage to the hull and topsides.

Monel is highly resistant to corrosion and the anchor will not rust in fresh or salt water.

Designed and manufactured by the Youngstown Welding & Engineering Company of Youngstown, Ohio, the unit has not yet been assigned a name. This will await the outcome of a prize name contest that closes on March 15.

Pressure Regulators

Foster Engineering Company Catalog 70 Bulletin 5 covers Foster U-Type Pressure Reducing Regulators for air, water and other gases and liquids. These Regulators are adaptable for waterworks, buildings, residences, process plants, power plants and marine service—wherever accurate regulation is required, regardless of volume and variation in initial pressure.

The mechanism and operation of each Regulator is described in detail, and complete instructions are given for dismantling and reassembling. This bulletin is well illustrated and contains wash drawings, line drawings and dimension drawings for each style.

Those interested in the accurate reduction of pressures will find this new catalog invaluable in the selection and operation of the proper Regulator for either normal or special conditions.

European Radio

(Continued from page 39)

for her sister ship, the R.M.S. Queen Mary. The installation will follow the same general lines as that which has been found so effective on the earlier ship (enabling her to handle on her maiden voyage the record traffic of 175,000 paid words of telegraph traffic, 291 radiotelephone calls, and 11½ hours of broadcast program), and will include the feature of separate transmission and operating rooms with complete remote control of keying, power, and wave length from the combined operating and reception room.

The first passengers' radio telephone service installed in British cross-Channel ships was introduced in March, 1938, by the International Marine Radio Co., on board the new British and Irish Line's motor vessels Leinster and Munster. This service, which was inaugurated by an exchange of radiotelephone greetings with the Queen Mary in mid Atlantic, marks an important advance in communication facilities for passengers traveling between England and the Irish Free State.

The ship-to-shore low power telephone service to trawlers continues to show an increase in traffic, and facilities are now provided in both Great Britain and Norway for the extension of such calls over the ordinary subscribers' network.

The application of ultra-short-wave sets to harbor craft with means for selective calling is arousing interest in ports where the use of the more usual marine wave lengths is attended with difficulties.

Auto Alarms

(Continued from page 38)

was the first station to get this information on the air. WSL immediately cleared the air of all messages and kept it clear until the seaplane was found.

Exactly twelve minutes elapsed from the time Chapman radioed, "Sinking, Sinking, Sinking," until the auto alarm signal as transmitted by coastal station WSL at Amagansett, Long Island, actuated the auto-alarm receiver on the Esso Baytown, which had in turn received the message from WAQI, Pan American station.

Chapman's estimate of the actual position of the disaster was so accurate that the Esso Baytown picked up the survivors at the exact spot indicated.

The need of such protection as a device like the auto alarm signal can give has been recognized since the sinking of the Titanic in April, 1912. At that time the Carpathia sailed within a few miles of the stricken ship but did not hear the SOS calls because the wireless operator aboard was asleep. It will be recalled that the Carpathia picked up the signal the following morning and returned to the scene of the disaster, playing a major part in the rescue work.

Book Reviews and Trade Literature

How to be a Responsible Citizen, by Roy V. Wright and Eliza G. Wright; 215 pages, 5 x 8, bound in green buckram with gold stampings. Published by the Association Press, New York; price $2.00, net.

This very useful piece of bookmaking is not the standard type of a treatise on civics so much as an everyday handbook for the ordinary citizen. It presents detailed information on the ways and means that every citizen can and must use to insure truly representative and constructive rule in the various units of government that constitute the 48 democracies that are combined in the republic known as the United States of America. It should be very valuable to parents, teachers, and social workers—a book that every citizen should study and should apply.

Songs of American Sailormen, by Joanna C. Colcord; 206 pages 7 x 10, with many illustrations and songs set to music. Bound in tan buckram with blue and gold stampings; published by W. W. Norton and Company Inc., New York; price $3.50, net.

This is an enlarged and revised edition of the book "Roll and Go," by the same author, published in 1924. It is illustrated by the noted American marine artist Gordon Grant, and by halftones of some fine old lithographs, water colors and photographs of famous American clipper ships.

Sections of the work cover: (I) The Singing Sailor; (II) Short Drag Shanties; (III) Halliard Shanties; (IV) Windlass or Capstan Shanties; and (V) Forecastle Songs. Altogether 107 songs and shanties compose this collection.

Joanna C. Colcord was born at sea in the South Pacific on a sailing ship of which her father was master. Most of her early life was spent at sea on her father's ships in the China trade out of Boston. This book is therefore edited and annotated with authority. Norton and Company have done a very creditable job in the mechanics of book making. The combined result is a volume that would grace any library and will give pleasure and profit to anyone interested in America's glorious days of sail.

Trade Literature

Types SH and DH speed reducers, used with all prime movers such as electric motors and gas, oil or diesel engines, and suitable for any application where economy of power transmission and exact speed reduction are important, are extensively described in an illustrated booklet published by the Westinghouse Electric & Manufacturing Company and designated Descriptive Data 3620.

The standard gear ratios range from 2.82:1 to 70.5:1 and capacities from one to 500 horsepower, affording a standard gear unit for almost any application and speed. Type SH is a single-reduction unit, with 13 standard ratios ranging from 2.82:1 to 9.5:1 available in each size, and Type DH is a double-reduction unit, with 15 standard ratios ranging from 11.8:1 to 70.5:1. Special ratios can be furnished with either type.

Westinghouse Gearmotors. Westinghouse gearmotors, self-contained drives consisting of a high speed Westinghouse motor and necessary speed reducing unit, are illustrated and discussed in a booklet recently published by the Westinghouse Electric & Manufacturing Company and officially designated Descriptive Data 3610.

Various types are available: single reduction gearmotors, with standard gear ratios up to and including 5 to 1; double reduction gearmotors, with standard ratios, 5.6:1 to 10:1, inclusive; double reduction gearmotors, with standard ratios, 11.2:1 to 40:1, inclusive; and triple-reduction gearmotors, with standard ratios, 45:1 to 200:1, inclusive. Gearmotor ratings are available from ¾ to 75 horsepower with any of the three standard motor speeds from 1750 to 870 r.p.m. There are 46 standard gear ratios available with each of the motor speeds, giving output speeds that range from 4.4 r.p.m. to 1550 r.p.m Additional speed changes are possible by using suitable pulleys, sprockets and chains, or pinions, on the output ends of non-couple drives.

Engineering Properties of Nickel, Technical Bulletin T-15, published by the International Nickel Company, Inc., research and development division.

This 20-page bulletin contains extensive tabulated data on the mechanical properties and physical constants of nickel.

The section on mechanical properties deals chiefly with the correlation of tensile properties with hardness, and with the more specialized mechanical properties, such as ductility, strength at elevated temperatures, endurance limits, torsional and shear strengths, compressive strength, toughness, rigidity and hardness.

The section on the corrosion-resisting properties of nickel is a brief summary of its behavior under a very wide variety of exposure conditions.

The section on working instructions includes brief summaries of the proper procedures for hot and cold working, annealing, machining, welding and brazing and pickling.

A short section is devoted to a description of mill products, including available sizes and forms, and a discussion of tempers, surface qualities and standard sizes.

The bulletin contains a separate section devoted to the more commonly used special nickel alloys. These are low-carbon nickel, "D" Nickel and "Z" Nickel. The section on "Z" Nickel includes details of proper methods of annealing and heat treatment.

Tooth Pressures for High Speed Helical Gears: Double helical gears are generally recognized as essential parts of marine turbine propelling units and are also widely applied in small and medium size turbo-generator sets, large turbine-driven centrifugal pumps as used in water works systems, and in such applications as drives of high speed blowers and compressors from standard speed motors and diesel engine drives of slow speed machinery. While the majority of such gears have met all expectations as to quiet operation, reliability and long life, there have been certain instances in which short life, noise, pitting and faulty operation have resulted from the use of incorrect methods in figuring tooth pressures. Much interest, therefore, attaches to the simplified analysis of the gear rating problem, which is given in a paper by A. Peterson, who originated the method used for the past 20 years in calculating high speed helical gears manufactured by the De Laval Steam Turbine Company. Reprints of this paper are available on request.

Synchronized Control for Reciprocating Pumps, Bulletin W-445-BC of the Worthington Pump & Machinery Corporation: For automatic delivery control of high pressure reciprocating pumps, a synchronized unloading and loading device has been developed by Worthington. Suction valve controlled, air actuated, the new mechanism guarantees a quick but gradual decelerating fluid delivery from full flow to zero, and vice versa. In either case the action is the same. The time required for fully unloading or loading any type of multiple plunger reciprocating pump, horizontal or vertical, duplex, triplex or otherwise does not exceed one-half of one revolution of the pump.

Diehl Motor Price List and Catalog No. 39, a new publication of the Diehl Manufacturing Company, contains 28 pages filled with essential data and illustrated description covering motors, generators, motor drive grinders, ventilating equipment, and pump drives.

This booklet includes a great wealth of application data arranged in simplified form and well indexed for prompt and easy reference.

Welding of Wrought Iron, published by A. M. Byers Company. This 20-page, profusely illustrated booklet, prepared as a service bulletin by the Byers Engineering Service Department, is not a reprint of the book issued on the same subject in 1934. It does contain the same fundamental theory and data, but adds thereto the results of research during the past five years, including tests by: the National Weld Test Bureau; American Bureau of Shipping; Lloyd's; and the Bureau of Marine Inspection and Navigation of the U. S. Department of Commerce.

There is also incorporated a considerable amount of practical information gleaned from various fields of application.

Marine Piping, Bulletin No. 9 of the National Tube Company: a 45-page profusely illustrated booklet comprising a general section devoted to descriptions of the uses of tubular steel products aboard ship, and a technical section devoted to tables and graphs showing the physical properties of the various National Tube products applicable to marine service. This technical section gives complete data necessary for design of masts, booms, columns and pipe systems, including not only capacities but creep, fatigue and expansion factors. The subsection on pipe and tube bends is particularly valuable.

Batteries for Marine Service is a four page leaflet recently published by the B. F. Goodrich Company, Akron, Ohio, and is available on request.

The leaflet pictures and describes the line of Goodrich batteries for marine services. It includes prices, specifications and assembly plans for diesel-starting and other marine batteries, as well as instructions on installation and care.

Organization Notes

Westinghouse Promotions

According to a recent announcement by **Ralph Kelly,** vice president, **Frank Howell Stohr** became manager of all industry sales departments of the Westinghouse Electric & Manufacturing Company on February 1, with headquarters at East Pittsburgh.

Simultaneously, Mr. Kelly announced the appointment of **R. A. Neal** as assistant to vice president; **C. F. Lloyd** as manager of the central station sales department; and **W. A. Furst,** formerly general contract manager, as full-time coordinator of Navy and maritime activities.

Most important of these promotions, from the merchant marine point of view, is that of Mr. Furst, and we therefore append this "thumb-nail" sketch of his career.

Born in Baltimore, Md., in 1892, he was graduated from the University of Maryland in 1912. He was employed by the Baltimore & Ohio Railroad until 1914, when he became assistant superintendent of the meter and installation department of the Consolidated Gas & Electric Company of Baltimore. From 1917 to 1919 he was associated as an electrical engineer with the Emergency Fleet Corporation, and later with the Lockwood Green Company of Boston. In 1920 he became associated with Westinghouse.

New Head of Finance Department

Announcement is made by **Lewis H. Brown,** president of Johns-Manville Corporation, that **Robert W. Lea,** who has been president of the West Virginia Coal and Coke Company, has been elected a vice president of Johns-Manville Corporation by the Johns-Manville board of directors. Mr. Lea will be in charge of finance, and will take over the position formerly held by **Enders M. Voorhees,** who left Johns-Manville to become chairman of the Finance Committee of the United States Steel Corporation.

Mr. Lea, University of Wisconsin, School of Commerce, A. B., 1907, worked first for Otis Elevator Company, then with Moline Plow Company as vice president in charge of Western sales branches and export sales.

During the World War as major, and later colonel, Procurement Division of the United States Army, he had charge of purchase and distribution of animal-drawn transport and equipment for U. S. military forces.

After the war Mr. Lea served: from 1919 to 1926, as vice president and general manager of the Stephens Motor Car Company; as president of the Moline Implement Company from 1926 to 1929; with the Continental National Bank, Chicago; during 1933 as administrative assistant, N.R.A., Washington; and two years as president of the Hammond Lumber Company, San Francisco.

On the Ways—

SHIPS IN THE MAKING

LATEST NEWS FROM AMERICAN SHIPYARDS

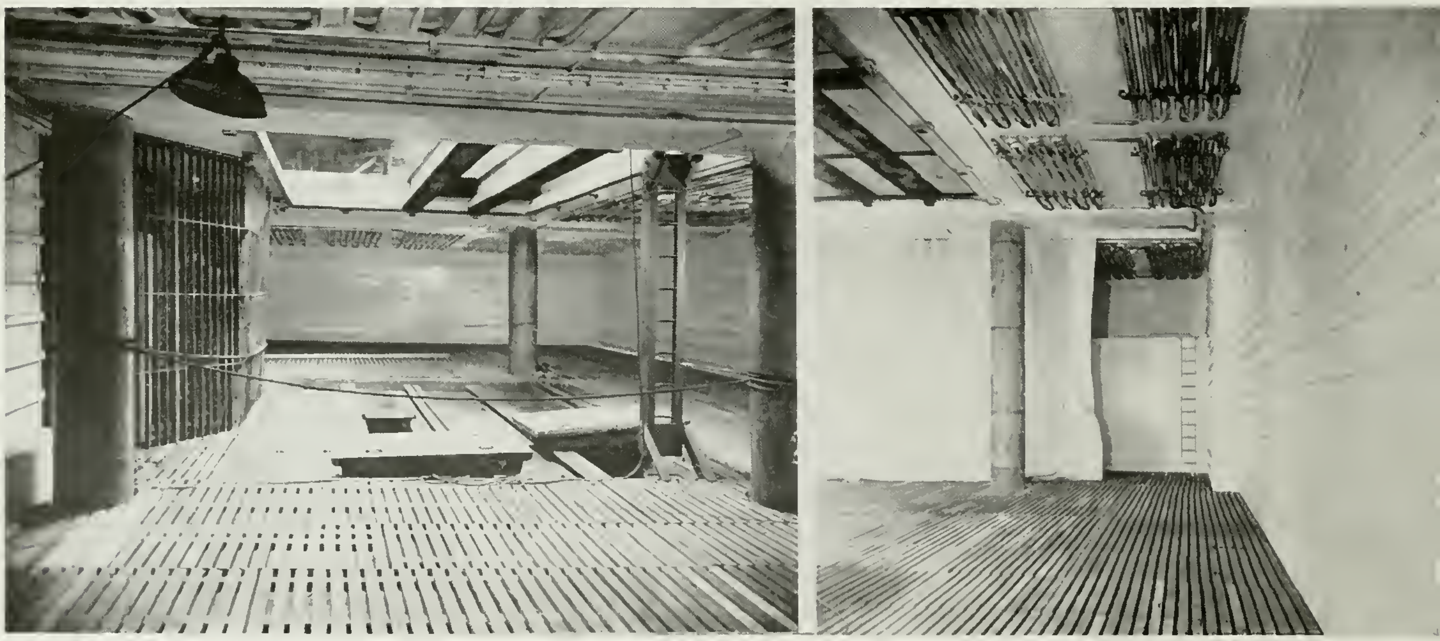
S.S. Vancouver Repairs Involve Large Reefer Reconstruction

On February 17 the huge repair contract on the Hamburg-American cargo liner S.S. Vancouver was completed and she left the yard to resume her regular runs in the Pacific Coast-West Europe service. This vessel was sunk in the Oakland estuary by an explosion which tore a large hole in her side in way of the engine room. In addition to structural repairs it was necessary: to overhaul and recondition all diesel auxiliary generating sets and the main steam turbines, boilers, condensers and other engine room auxiliaries; to rewind all electric motors; to renew all damaged furniture and bulkheads; and to completely remove all of the German Torfolium insulation and its sheathing and reinsulate with cork board and granulated cork. This last item was undertaken by the Mundet Cork Corporation of San Francisco, who supplied and applied all the insulation and the finish over the insulation, working as sub-contractors to Moore Dry Dock Co.

The refrigerating system is of the modified brine spray cold air circulating type, and covers 104,000 cubic feet of cargo space. The replacement of insulation require 200,000 board feet of 8-inch Munde "Jointite" special light weight cork board, and 2 carloads of granulate cork.

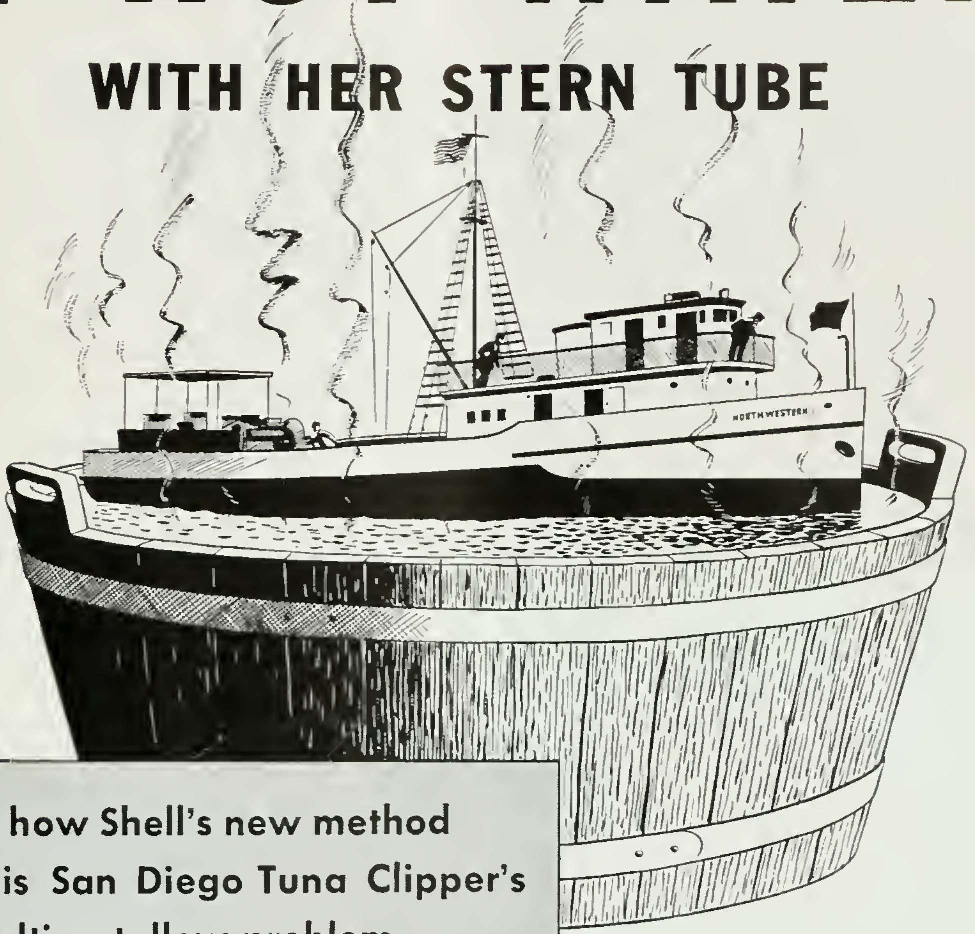
The inner surface of the cork board was covered by a layer o Keasbey and Mattison Co. asbestos board applied directly on the cork with Mundet waterproofing cemen reinforced by screws. Over this outer finish battens were secured t preserve the surface from injur through cargo contact. This insula tion will enable the ship's refrigera tion plant to maintain a temperatur of 20° below zero if necessary.

The whole interior surface was painted with special refrigerato white enamel, giving a sanitary, fir resistant, waterproof surface, shown in the illustrations herew



Two views in one of the refrigerated holds of the Hamburg-American cargo liner Vancouver, showing the finished surface produced by the use of Mundet Jointite corkboard.

THE *NORTHWESTERN* WAS IN "HOT WATER" WITH HER STERN TUBE



Read how Shell's new method solved this San Diego Tuna Clipper's melting tallow problem

THE warm, tropical waters down around Panama were a headache to engineer Tex Ellington. Tropical temperatures and soup-like water (itself 82° to 86° F.) set up terrific heat conditions below. Tallow stern tube lubricant melted, ran away. Damaging sand and silt worked into the sleeve — especially when they went in close to shore for bait.

The *Northwestern* was in "hot water" in more ways than one!

Then, a fellow engineer told Tex about the new Shell method of lubricating stern tubes with water-resistant grease. Tex had the system installed. Now he writes: "This simple, inexpensive operation of Shell's solved the problem. It even eliminated a leak in the shaft log. And I was also able to loosen the packing gland, thereby eliminating friction and reducing wear."

More and more wide-awake engineers like Tex Ellington, on large ships and small, are adopting this revolutionary SHELL METHOD OF LUBRICATING STERN TUBES. Already it has saved owners thousands of dollars on repairs.

A Shell marine engineer will gladly give you full details. Call your nearest Shell office today. Or write: Industrial Lubricants Division, Shell Building, San Francisco.

SHELL MARINE LUBRICANTS

FOR EVERY TYPE OF CRAFT AND OPERATION

SHELL MARINE ORZA OIL—For steam cylinder lubrication
SHELL MARINE ARGUS OIL—For Diesel engine lubrication
SHELL MARINE CHALMA OIL — For dynamo lubrication
SHELL MARINE MARICA OIL — For reciprocating engines
SHELL MARINE ARCTICA OIL—For ice machine lubrication
SHELL MARINE JANUS OIL— For turbine lubrication
SHELL MARINE TELEMOTOR OIL
GOLDEN SHELL MARINE MOTOR OIL

SHIPBUILDERS
and ENGINEERS

BUILDING WAYS FOR WOOD AND STEEL CONSTRUCTION

Three Plants

OAKLAND PLANT
Dry Dock and Machine Shop
Dry Dock cap.: 12,500 tons
Length 450 feet
FOOT OF FIFTH AVENUE
Tel.: GLencourt 3922

SAN FRANCISCO OFFICE AND PLANT
Machine Shop
and
General Repairs
1100 SANSOME STREET
Tel.: SUtter 0221

ALAMEDA PLANT
Two Dry Docks
3,000 tons and 5,000 tons
capacity
FOOT OF SCHILLER STREET
Tel.: ALameda 0533

GENERAL ENGINEERING
and DRY DOCK COMPANY

L. P. St. Clair Delivered

The new Union Oil Co. of California tanker L. P. St. Clair was delivered on March 1 by her builders, the Sparrows Point Yard of the Shipbuilding Division of the Bethlehem Steel Company. L. P. St. Clair is expected to arrive on the Pacific Coast about March 24.

Federal Delivers One, Launches Two

On February 1 Federal Shipbuilding & Dry Dock Company delivered to the U. S. Navy a 1500-ton destroyer, the Benham, DD397; and on February 4 they simultaneously launched two destroyers, the Anderson, DD411, and the Hammann, DD412. This firm expects to launch during March Hull No. 151, the first of three large, fast national defense featured tankers building for the joint account of Standard Oil Company of New Jersey and the U. S. Maritime Commission.

Moore Dry Dock Launchings

Moore Dry Dock Company announces that Hulls Nos. 193 and 194, the two lighthouse tenders, will be launched early in March. These vessels are of steel construction and have: an overall length of 174′ 10½″, a molded beam of 32′, a depth of 14′ 6″, and twin screws each propelled by a 500 horsepower triple expansion steam engine. One of these vessels is for Pacific Coast service and the other for Great Lakes service.

Work is progressing nicely on the preparation of building slips for Hulls Nos. 195 and 196, the two cargo vessels of the C-3 design building on a contract awarded by the U. S. Maritime Commission.

Orders for steel have been placed. Considerable new equipment, such as cranes, air compressors and tools have been installed. The fabrication of material will begin and the keel of the first vessel will be laid during March.

Sparrows Point Launches Tanker Mobilfuel

On February 27 the Sparrows Point Plant of the Shipbuilding Division of the Bethlehem Steel Company launched a large tanker for the Socony Vacuum Oil Company. This vessel was sponsored by Mrs. Georg V. Holton, who christened h Mobilfuel.

Fore River to Launch Cristobal

Hull No. 1469, the last of thre passenger and cargo vessels for th Panama Railroad Steamship Con pany, will be launched during Marc and christened Cristobal.

Sun to Launch Big Tanker

Sun Shipbuilding and Dry Doc Company on March 4 will launch sister tanker to the Cimarron, d scribed on page 23 of this issue Pacific Marine Review.

Electric Boat Delivers a Sub

The 1450-ton submarine Sarg was delivered to the U. S. Navy o February 7 by the Electric Bo Corporation of Groton, Conn. O March 15 this firm will lay the ke for a 1475-ton submarine to b named Tautog, thus maintaining submarines under construction. Th submarine Saury will be delivere in April and the keel for submari Thresher laid in May.

Centrifugal Castings for Marine Use

Two 22" x 17' bronze shaft sleeves in the shop.

For certain purposes aboard ship it is necessary to use castings both in ferrous and non-ferrous alloys and in many applications it is essential that the metal in these castings should be dense and uniform in grain structure and free from sand inclusions and blow holes. The best way to insure these features in castings of cylindrical shape is to specify centrifugal castings, or, in other words, castings poured into a revolving mold so that the centrifugal force acting on the liquid metal forces it against the inside surface of the mold and forms a dense solid layer of uniform structure and thickness. By this method hollow cylindrical castings of surpassing quality can be produced with good economy.

Notable applications aboard ship are bearings, bushings, rings, washers, cylinder liners, pump liners, expansion joints, and (possibly most important) propeller shaft sleeves.

Centrifugal casting requires considerable special and costly heavy equipment and only a few foundries in the United States are equipped for this work. Prominent among them and especially equipped to take care of the marine industry is the Shenango-Penn Mold Company of Dover, Ohio.

In the illustrations herewith we show some of their products.

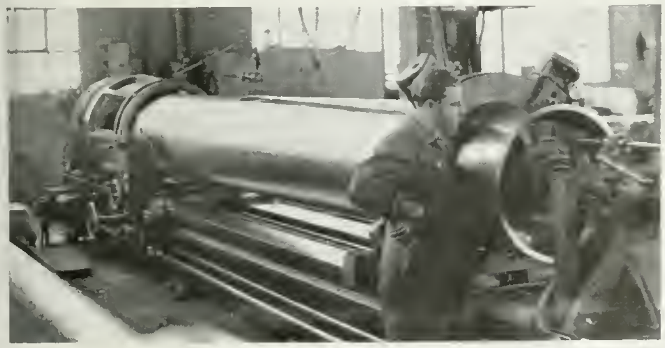
This firm is equipped to produce tubular forms centrifugally cast in outside diameters from 1 inch to 26 inches and in lengths from 2 feet to 26 feet and in the following range of metals:

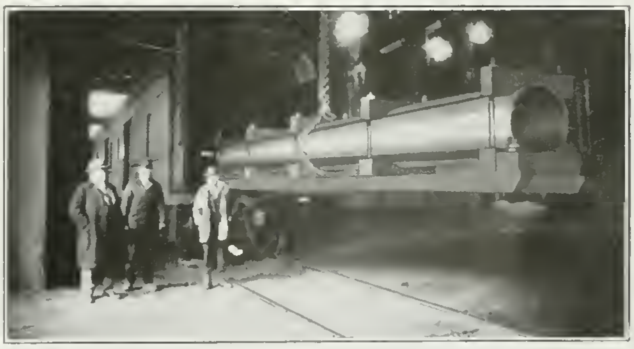
Standard bronzes, aluminum bronze, manganese bronze, brass, copper, nickel, monel metal, Everdur, P. M. G. metal, Ni-Resist, semisteels, high strength cast iron.

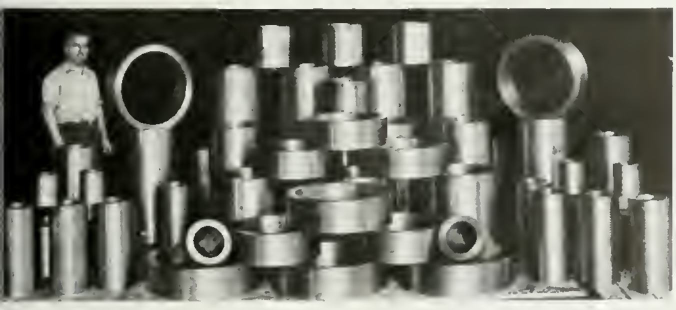
In producing propeller shaft sleeves Shenango-Penn are prepared to adhere strictly to the rules of: American Bureau of Shipping; Lloyd's Inspection Bureau; Bureau of Marine Inspection and Navigation, U. S. Department of Commerce; U. S. Navy; and/or any other inspection agency.

The plant at Dover is fully equipped to finish all castings to customer requirements. Delivery of castings can be either rough casting, semi - machined, completely machined, or assembled.

Thomas A. Short of San Francisco is marine representative for the Shenango-Penn Mold Company in Northern California.







Top, left to right: Method of boring to close tolerances large propeller shaft sleeves; large sleeve on skids being loaded for express shipment. At left: A shipment of nickel-silver bronze castings for the U. S. Navy for use as sealing rings.

It often pays to decelerate promptly.

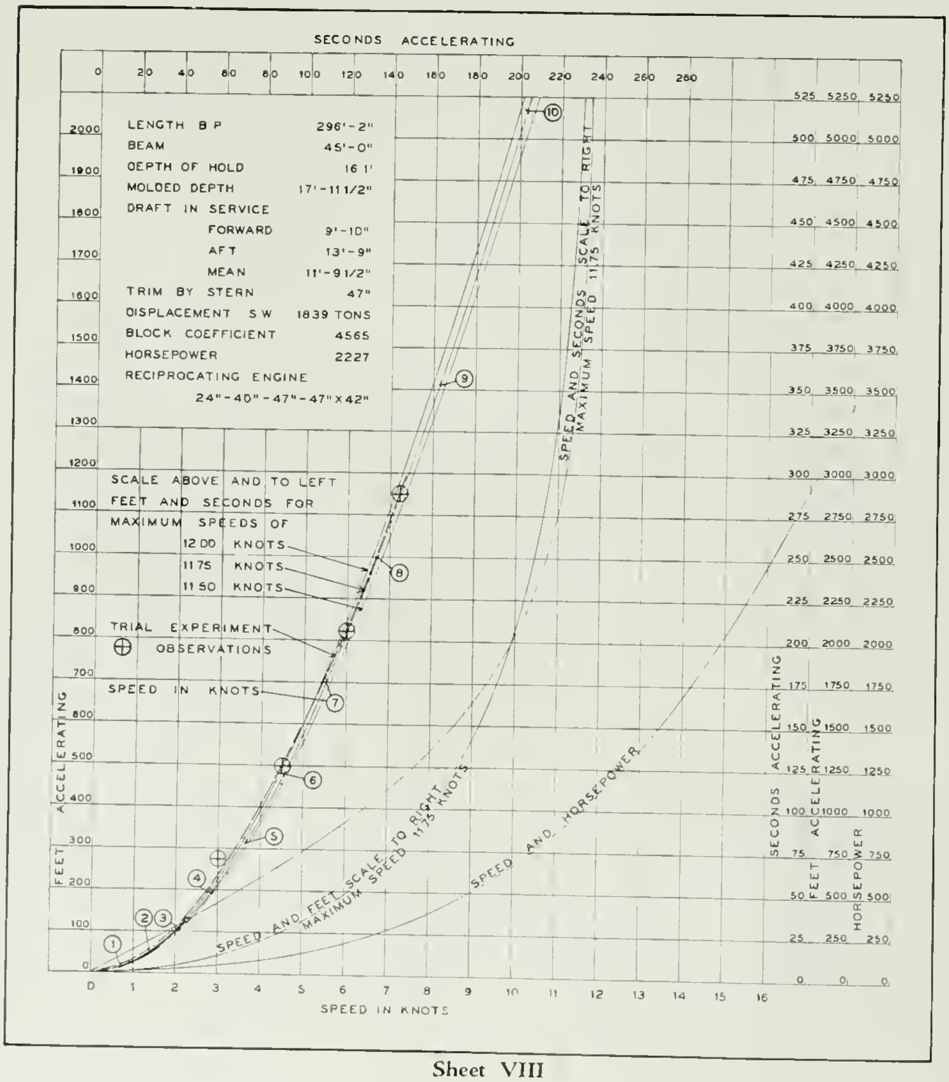
The Deceleration,

and Intermitten

By D. W. DICKIE   of

II. Acceleration

To illustrate the practical application of the formulas, take the case of a ship backing away from the wharf. A line was held by a man on the bow and payed out from a reel on the shore as she backed away from the slip. The line was hauled in while wet and measured. Also transit men were stationed on one pier north and one pier south of the pier where the vessel originally was moored, taking angles a times flagged from the top of th pilot house of the boat.



Sheet VIII

The particulars of the vessel are

Length overall	306′ - 2″
Length between perpendiculars	296′ - 2″
Beam molded of the hull at the deck	45′ - 0″
Beam at the waterline	40′ - 4″
Depth molded	17′ - 11½
Draft—Forward	9′ - 10″
Aft	13′ - 9″
Mean	11′ - 9½″
Displacement in tons of 2240 pounds	1839
Horsepower at 100 r.p.m.	2227
Block coefficient	.4565

The vessel has a triple expansion engine with 4 cylinders, 24″ high pressure, 40″ intermediate pressure, two low pressure 47″ diameter, and a stroke of 42″, giving the same power ahead as astern.

From Morton and Goudie's Speed and Power Computer:

Limiting Speed 23.33 Knots

Knots	Speed Ratio	Horse-power
10.43	.440	745
10.65	.450	780
10.81	.460	815
11.25	.480	910
11.68	.500	1010
12.00	.513	1090
13.00	.559	1360
14.00	.601	1685
15.00	.644	2070
16.00	.684	2450
17.00	.728	2950
18.00	.770	3470

These results are plotted on Sheet 8.

Acceleration Deceleration Ships

Quite often it pays to keep out of the other fellow's way.

The horsepower used in backing out of the dock is governed by the pitch of the propeller, the revolutions and the power available. The engine was turned from 55 to 60 r.p.m., while at full speed it turns 100 r.p.m.

From the speed and horsepower curve the vessel makes 15.4 knots, turning 100 r.p.m. at *2227* horsepower, which checks with her actual performance on the run.

From the revolutions of the propeller,

$$\frac{60}{100} \times 15.4 = 9.24 \text{ knots.}$$

Assuming a slip of 15% at 15.4 knots and a slip of 6% at 9.24 knots,

$$9.24 \times \frac{.94}{.85} = 10.22 \text{ knots.}$$

Based on the pitch of the propeller this should be the maximum speed of the Acceleration Curve, and from the horsepower curve a speed of 10.22 knots requires 708 horsepower.

However, we know that it takes more power to turn a given propeller at any given speed if the vessel is not up to speed for which the propeller is designed.

If we take $\frac{60}{100}$ of *2227* horsepower = 1336.2 horsepower, we know that the propeller will not absorb all of it but will take part of it. If we take a mean between 1336 horsepower and 708 horsepower we will come fairly close to the power used.

$(1336 + 708) \times \frac{1}{2} = 1022$ horsepower.

From the speed and horsepower curve 1025 horsepower gives a speed of 11.75 knots. Plot the Acceleration Curve using as a basis for the calculation:

Displacement in tons of 2240 pounds	1839
Speed in knots	11.75
Horsepower	1025

$$\frac{\underset{\text{Feet}}{6080} \times \underset{\text{knots}}{11.75}}{\underset{\text{min.}}{60} \times \underset{\text{sec.}}{60}} = 19.84 \text{ feet per second} = V_1$$

VALUES OF THE FACTOR "M" IN THE "DISTANCE" FORMULA FOR DECELERATION AND ACCELERATION $L = \frac{D}{Mr}$

	DECELERATION						ACCELERATION
POWER REVERSING	100%	2/3	53%	40%	32%	22%	100%
L_1	92 79	70 19	60 67	51.35	45.39	37 55	INFINITY
$L_{31/32}$							23 07
$L_{15/16}$							30.47
$L_{7/8}$	113 14	84 11	71 96	60 14	52 65	42.89	44 33
$L_{3/4}$	144 12	105 13	88 92	73 25	63 40	50 69	77 80
$L_{5/8}$	195 05	139 47	116 48	94 40	80.62	63 01	129.85
$L_{1/2}$	288 24	201 97	166.45	132 48	111 41	84 73	223 58
$L_{3/8}$	488 83	336.05	273 31	213.50	176 57	130.15	424 41
$L_{1/4}$	1060.94	717 75	576 99	443.02	360 52	257.22	996.60
$L_{1/8}$	4148 49	2776 36	2213 70	1678 53	1349 16	937 41	4084 12

VALUES OF THE FACTOR "K" IN THE "TIME" FORMULA FOR DECELERATION AND ACCELERATION $T = \frac{D}{KrV_1}$

	DECELERATION						ACCELERATION
POWER REVERSING	100%	2/3	53%	40%	32%	22%	100%
T_1	40 95	29 63	24 87	20 20	17 23	13 32	INFINITY
$T_{31/32}$							15 52
$T_{15/16}$							18.73
$T_{7/8}$	44 74	32.02	26.70	21.52	18 25	13.98	23.75
$T_{3/4}$	49 97	35 34	29 26	23 37	19 68	14.91	33 05
$T_{5/8}$	57 57	40 19	33 00	26 09	21 78	16 27	43 86
$T_{1/2}$	69 36	47 79	38 90	30.40	25 13	18 46	58.55
$T_{3/8}$	89 64	60.99	49.22	38.00	31 08	22 37	81.58
$T_{1/4}$	131 27	88 38	70 78	54.00	43.72	30 80	125 91
$T_{1/8}$	258 60	172 85	137 69	104 24	83 65	57 92	255 93

Sheet I

$$\frac{1025 \times 550}{19.84} \times 55.5\% = 15760 \text{ pounds thrust} = R$$

Where 1025 is the assumed shaft horsepower 550 is the foot pounds per second equivalent to one horsepower, and 19.84 is the corresponding speed of the ship in feet per second or V.

The 55.5% is the efficiency of the propeller as before.

$$r = \frac{R}{V_1^2} = \frac{15760}{(19.84)^2} = 40.06 = r$$

which is the number of pounds to pull the vessel along at unity speed, or one foot per second (about 6/10 of a knot).

Displacement in pounds = 1839 × 2240 = 4,123,000 lbs.

Take out the constants and we have,

$$\frac{D}{r} = \frac{4{,}123{,}000}{40.06} = 102900 \text{ and}$$

$$\frac{D}{rV_1} = \frac{4{,}123{,}000}{40.06 \times 19.84} = 5188$$

Using the $\frac{D}{r}$ and $\frac{D}{rV_1}$ numbers in conjunction with the constants "M" and "K" of Sheet 1 for acceleration, we get:

Speed	Knots	Feet Accelerating	Time	Seconds Accelerating
V_1	11.75	Infinity	T_1	Infinity
$V_{31/32}$	11.38	4460	$T_{31/32}$	334.1
$V_{15/16}$	11.02	3375	$T_{15/16}$	277.0
$V_{7/8}$	10.28	2320	$T_{7/8}$	218.2
$V_{3/4}$	8.81	1322	$T_{3/4}$	156.9
$V_{5/8}$	7.34	792	$T_{5/8}$	118.3
$V_{1/2}$	5.88	460	$T_{1/2}$	88.65
$V_{3/8}$	4.41	242.2	$T_{3/8}$	63.61
$V_{1/4}$	2.04	103.2	$T_{1/4}$	41.20
$V_{1/8}$	1.47	25.19	$T_{1/8}$	20.23

These results are plotted on Sheet 8 with speed as the base.

The "Feet Second" curve was then plotted, combining the two previous curves, and is shown on Sheet 8. To see what the error would be a curve was plotted for an ultimate speed of 12 knots and another for an ultimate speed of 11.5 knots, or one-quarter of a knot each way from the 11.75 knots ultimate speed.

The test experiment backing out of the dock at "half astern," 55 to 60 r.p.m. per minute, was made about six weeks later and gave the following:

Time in Seconds	Feet Traveled
0	0
60	275
90	500
120	818
145	1150

the "half ahead," 55 to 60 r.p.m. for 35 seconds; and "full ahead," 100 r.p.m. for 10 seconds, which brought the steamer to rest in 165 feet, a total travel of 1315 feet.

Plotting the experiment acceleration figures, we see that there seems to be an error of 5½ seconds in the first sight, otherwise the readings make a fair curve, shown on Sheet 8. As the vessel used oil fuel the flow of the liquid may have had an effect on the first reading.

MEASURING DISSOLVED OXYGEN

It is now generally recognized that removal of dissolved oxygen from boiler feed water is desirable in order to avoid corrosion of piping, economizers and boilers. Deaeration can be accomplished both effectively and inexpensively by suitable mechanical equipment, but to insure continued proper functioning of, and adequate protection to, all parts of the equipment, the operating engineer needs facilities for conveniently and accurately measuring the dissolved oxygen content of water.

The chemistry of the dissolved oxygen test is relatively simple. A solution of manganese salt and a solution containing a strong alkali and an iodide are introduced into the water to be tested. The two solutions interact to produce a precipitate of manganese hydroxide, which is rapidly oxidized by, and in proportion to, any dissolved gaseous oxygen present. The solution is then made acid, whereupon the oxidized manganese compound reacts with the iodide which was added with the alkali and liberates free iodine equivalent to the oxygen originally present. Until the latter action is completed, the sample must be carefully protected from the oxygen of the air. A starch solution is then introduced, to which the free iodine gives a blue color. The liberated iodine is then measured by adding, drop by drop, a standard solution of sodium thiosulfate until the blue color disappears. The volume of sodium thiosulfate used indicates the amount of dissolved oxygen contained in the original sample.

The standard Winkler procedure just outlined has been adapted by Bull & Roberts, consulting chemists in New York City, to meet the needs of the practical engineer, and they have designed the testing cabinet shown in the accompanying illustration with a view to simplicity without sacrifice of essential accuracy.

The cabinet is of welded steel construction, with baked enamel finish, and all apparatus clips are of stainless steel. The reagent pipettes (liquid transfer tubes) are equipped with bulbs which automatically measure the desired quantity of the test solution, no pipettes into which the reagent is sucked up by the mouth being used. An automatic self-leveling burette (measuring

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tube) is used in the final titration (drop-by-drop measurement).

To gather the sample of water to be tested, specially designed sampling bottles which minimize the danger of trapping air at the completion of the sampling operation are provided. The bottles have Neoprene stoppers to avoid the negative interference which arises from the use of vulcanized rubber stoppers. The cabinet measures 17 x 13 x 7½ inches, and all apparatus is firmly secured against breakage. Plainly worded, but complete and precise, instructions accompany the cabinet and test kit.

Bull & Roberts are represented by the Griffin Chemical Company of San Francisco and Los Angeles, Clyde Williamson, marine manager.

DRAFT CONVENTION NO. 53

By DANIEL C. ROPER

Secretary of Commerce

The President of the United States recently, with the advice and consent of the Senate, ratified a number of draft conventions or treaties of the International Labor Organization, among which was Draft Convention No. 53.

A number of statements have appeared recently in the press which indicate that there is some misunderstanding concerning the provisions of Draft Convention No. 53, "concerning the minimum requirements of professional capacity for masters and officers on board merchant ships," which, with two understandings appended, was ratified as a treaty by the President of the United States, the advice and consent of the Senate to the ratification having been given on June 13, 1938. That convention becomes effective on October 29, 1939.

The convention, when read together with the understandings appended, applies to all documented vessels of the United States navigating the high seas only, with the exception of ships of war, government vessels, or vessels engaged in the service of a public authority, which are not engaged in trade, and wooden ships of primitive build such as dhows and junks.

The convention provides that no person shall be engaged to perform or shall perform the duties of master or skipper, navigating officer in charge of a watch, chief engineer, or engineer officer in charge of a watch, unless he holds a certificate of competency to perform such duties, issued or approved by the public authority of the territory where the vessel is registered.

The convention provides that national laws or regulations shall prescribe a minimum age to have been attained by and a minimum period of professional experience to have been completed by candidates for each grade of competency certificate; and that national laws or regulations shall provide for the organization and supervision by the competent authority of one or more examinations for the purpose of testing whether candidates for competency certificates possess the proper qualifications. However, it expressly permits signatory nations to allow the issuance of competency certificates for a period of three years from the date of ratification to persons who have not passed such an examination but who have had sufficient practical experience and no record of any serious technical error against them. The convention also provides that national laws or regulations shall prescribe penalties or disciplinary measures for cases in which the provisions of the convention are not respected.

It is to be noted that the convention does not in any respect set up any minimum or other manning requirement and does not require any larger complement of officers on any vessel to which it applies than is now employed or serves on such a vessel. It simply provides for certification or licensing of such persons as may be performing the duties of skipper, navigating officer in charge of a watch (if there be one) or chief engineer or engineer officer in charge of a watch (if there be any) on board vessels to which the convention applies. The convention does not require that additional persons shall be employed on any vessel nor does it extend the provisions of any existing statute requiring the division of officers or crews into watches or limiting the hours of labor of any officers or members of the crew to eight hours a day.

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The convention does provide for certification or licensing of such persons as may be performing the duties of master or skipper, navigating officer in charge of a watch, chief engineer and engineer officer in charge of a watch on documented fishing vessels and yachts navigating the high seas, but does not in any way make minimum requirements for such vessels. However, there is a provision in the convention providing that national law or regulations may grant exceptions or exemptions in respect of vessels of less than 200 gross registered tons.

The Department of Commerce is now giving very careful consideration to recommending enabling legislation to make effective the provisions of the Convention and to take advantage of that provision in the Convention permitting the exemption from its terms of vessels of less than 200 registered tons, particular attention being paid in this respect to yachts and fishing vessels.

It is to be noted that under no circumstances does any provision of this convention apply to any numbered motor boat, out-board motor boat, or undocumented sailboat, and that therefore, no legislation or regulation is necessary to exempt such vessels.

The terms of Draft Convention No. 57 may possibly have given rise to some of the statements concerning the requirements for a particular member of certificated or licensed officers on yachts and fishing vessels.

"Draft Convention No. 57, "concerning hours of work on board ship and manning," has been ratified by the President with the advice and consent of the Senate but does not become effective until four other nations, each of which has a merchant marine of more than one million gross tons of seagoing shipping also have ratified the convention and deposited their ratifications with the Secretary-General of the League of Nations. This convention is applicable only to documented vessels which are engaged in the transportation of cargo or passengers for the purposes of trade and are engaged on an international voyage. Sailing vessels with auxiliary engines, and vessels engaged in fishing, whaling, or similar pursuits, or in the operations directly connected therewith, are specifically exempted from the provisions of the Convention. Furthermore, as vessels which are employed exclusively for pleasure are not engaged in the transportation of cargo or passengers for the purposes of trade, the provisions of the convention do not and can not apply to those vessels.

Spunyarns and Catharpins

● That Wanderlust

"Your boy Josh says he's going to town to seek employment."

"Yep," answered Farmer Cortossel. "I don't blame him. Everybody feels occasionally like gettin' away an' lookin' fur work 'stid o' stayin' where he knows it'll be waitin' fur him regular."

So we pause to introduce a beautiful piece of iambic pentameter or something, that came so recently from Scotland, it still smells of heather:

A bugler named Sandy McDougal
Found ingenious ways to be frugal
He learned how to sneeze
In various keys
Thus saving the price of a bugle

—Union Oil Bulletin.

● Retort Moderne

"Well, my boy," said the old sea captain. "I suppose it's the old story —'the fool of the family goes to sea.' "

"Oh, no, sir," replied his grandson, "that has all been changed since your young days."

● Not So Savory

Mary had a littel gote,
She thot it wuz so swell;
But Mary had hay feever
An' coodent smell the smell.

● Hose on the Palette

Pat: "That's sure a queer pair of socks you got on, Mike; one is white and the other is red."

Mike: "Yeh, Pat, they sure are funny, but I got another pair at home just like them."

Running Lights of Pacific Shipping

R. J. RINGWOOD

Richard J. Ringwood, freight traffic manager of Panama Pacific Line. It's a pleasure to present his amiable features to our readers. His friends are countless . . . as he has been a freight man in and around San Francisco for many, many years. We remember him back in the old Admiral Line days. He became closely acquainted with PPL ships when Pacific Steamship Company were the line's Coast agents. In 1931 Panama Pacific established their offices out her and "Dick" was appointed F. T. M. At this writing he is rendering yoeman's service in welcoming America's largest liner, the S.S. Washington, on her cruise trip to Treasure Island (and way ports). Married—there's a son and a daughter. The Ringwood home is above Oakland's beautiful Lake Merritt. Yes . . . he's a bridge commuter.

R. M. ALVORD

R. M. Alvord, newly-appointed commercial vice president of General Electric Company. Manager of Pacific Coast District, headquartered at San Francisco. . . Mr. Alvord has been with G-E since graduation from Iowa State College in '04. Came to San Francisco in 1906 after Schenectady training. Started here as a salesman. Up the ladder . . . he was later in charge of the G-E supply department—then manager of San Francisco District—and in 1936 his administrative duties were made Pacific Coast-wide in scope.

His many friends in shipping and technical-engineering circles are congratulating his on the recent appointment.

L. K. BISHOP

L. K. Bishop makes our P. M. R. spotlight this month upon his elevation to new executive post of Pabco. He is newly-named manager of firm's important Central District.

Mr. Bishop is very well known to our marine friends by reason of his ten-year position as manager of The Paraffine Companies, Inc. paint division. He has always taken personal interest in the marine market both in production and selling work . . . and will devote even greater attention to marine-industrial development factors in his new position.

Propeller Club of California

News of the Month

Two important dates have been announced. The Annual Spring Banquet will be held on April 15 . . . on **Treasure Island!**

Arrangements are also progressing for National Maritime Day, May 22. The Propeller Club of California will observe the event in conjunction with other sponsoring groups, thus following the practice of assembling a huge audience. The place will probably be the San Francisco Commercial Club's main dining hall.

- **Committee Chairman**

Paul Faulkner has been named as chairman of the Publicity Committee for 1939, succeeding himself to the important post by reason of a splendid record last year.

- **February 7 Luncheon**

Club members had the extreme privilege of hearing **Frank P. Foisie** address a capacity attendance on the first February luncheon program.

Mr. Foisie, newly-appointed president of the Waterfront Employers Association of the Pacific Coast, used as his subject, "Where We Are in Port Labor."

Capt. Henry Blackstone was chairman of the day.

- **February 21 Meeting**

On this date **J. F. Marias**, recently named as president of the State Board of Harbor Commissioners, was our guest speaker.

Speaker Marias was introduced by **Capt. Cyril Meek.**

President C. E. Finney relayed to the membership the enticing invitation of The Bilge Club to attend their big party at the Los Angeles Biltmore on February 25.

News of "The Bilge Club"

Pacific Marine Review,
San Francisco, Cal.

My dear Friends:

As your dead line approaches I find myself with little Bilge Club news to present. All the boys are getting out the dress clothes and airing them to get rid of the moth ball smell in anticipation of the big anniversary dinner on the 25th. Too bad that this event comes just after your dead line, but, that indicates that I will have plenty of news for the next number. In the meantime I am enclosing the announcement which I received today from which you can no doubt make up something for our column.

William A. Mason

And here is the announcement:

11th Annual Banquet

The usual annual drydocking and repair of the

S.S. "BILGER"

Will be undertaken at the Biltmore Hotel, Port of Los Angeles, Saturday, February 25, 1939, 7:30 p. m.

Specifications

1. Clean all growth from top sides and bottom.
2. Repack stern gland to insure tightness.
3. Overhaul canvas work (formal attire).
4. Have holds empty and gas-free.
5. Ship must be ready at 6:30 p. m. to load liquid cargo in deep tanks. Watch stability!
6. Ship must be ready to stow dry cargo in main holds commencing at 7:30 p. m. Due allowance should be made for finally trimming ship with further liquid cargo.
7. After these repairs are completed, quarter deck will be cleared for Entertainment—the best yet!
8. Line up "eccentrics"—check for tightness.

It is understood and agreed that Contractor will not be liable for damages or delays caused by strikes, accidents, shenanigans around drydock, delay of carriers and other delays unavoidable or beyond control.

Please make acceptance immediately by returning enclosed card, with check, to Lloyd J. Moore, P. O. Box 98, Terminal Island, California.

S.S. "BILGER"
Arthur R. Pegg, Master

H. R. GRAHAM

Simultaneously with announcement of opening in Los Angeles of Mitsui Line offices, H. R. Graham, dock and office executive on the Pacific Coast for thirty years, was appointed freight agent for the line in that city. He took over his new post on February 15, and is located at 510 W. Sixth Street. These offices expand the heretofore only merchandising office maintained by Mitsui.

Mr. Graham was first with American-Hawaiian, then was dock superintendent for Williams, Dimond & Co., and later was with the Waterfront Employers' Association of Southern California.

R. J. DE LEO

After twenty-nine years as an employee of the Copper River & Northwestern Railway Company, R. J. De Leo of Cordova, Alaska, has been appointed Cordova agent for the Alaska Steamship Company, succeeding **L. E. Dickinson,** who has been appointed agent at Ketchikan. **R. E. Veith,** who held the post at Ketchikan, has been transferred to the traffic department in the Seattle office.

ROBERT D. PICKETT

Transmarine Navigation Co., through **Max Linder,** president, has appointed Robert D. Pickett as district freight agent in Los Angeles. Mr. Pickett was previously with the company in San Francisco, and in his new headquarters will devote his time to the Brodin Line, newly acquired agency serving Mexico, Central America and Panama.

James Hammerberg is the new pier agent in charge of the berth at Long Beach.

Birthday Party

Without formal ceremony the Port of Oakland's twelfth birthday was observed this month by members of the Board of Port Commissioners. The members of the first board took their oaths of office on February 12, 1927.

In commenting upon the progress which the port has made in the last 12 years, **James J. McElroy**, president of the Port Commission, pointed out that when the first board took office Oakland was purely a local port and there was not one municipally-owned fireproof terminal in the harbor.

"Today," McElroy continued, "the development program which has been carried on under the direction of the Port Commission has given Oakland some of the finest marine terminals on the Pacific Coast.

"In constructing these general cargo terminals in accordance with the master plan of port development, the Port Commission has added 6980 linear feet of berthing space, 1,348,770 square feet of covered floor space and 577,220 square feet of open wharf area to the facilities of the harbor in the last 12 years."

McElroy also stated that the Port Commission has not confined its activities to construction, but has also increased the business of the port by solicitation and promotional efforts.

PORT OF OAKLAND BIRTHDAY PARTY
Left to right—Nelle Bechelli and Port Commission President James J. McElroy

A-H Boys Take The Air!

American-Hawaiian Steamship Company's Oakland District staff during February won widespread acclaim for its four man team victories in mental gymnastics over Radio Station KROW's popular "Skull-Cracker Contest." Scott Weekley conducts the brain twister competition each Monday night and it remained for the American-Hawaiian boys to challenge and upset the long win streak of the California Statistical Bureau squad.

This major upset was promptly followed by the American-Hawaiian quartet trouncing the well-known Forensic Club of Oakland.

Facing the mike without a quiver were John Winstead, Joe Whitsitt, Merle Woodside and Jack Crowley. They had been coached—and specially trained and even dieted—by Thomas J. Halcrow, Jr., Oakland District Manager. A score of questions were hurled at the A-H boys—for instance they had to know "What is a young beaver called?" Kittens. The range of interrogations covered chemical terms, geography, literature, opera, sports and history. "Who was Secretary of Treasury under George Washington?" Think fast, captain! It was Alexander Hamilton. We will announce the outcome of the contest with the Cresendo Club of San Francisco in next number. Watch for it. "Where is Lake Titicaca?" It's easy—if you know the answers.

New Officers of Robins Plant

Francis J. Gilbride, seated at left, was elected President of the Robins Dry Dock & Repair Company, Erie Basin, Brooklyn, N. Y., on February 16, 1939, to fill the vacancy caused by the death of George Dawe in Florida on February 9, 1939. With Mr. Gilbride are shown the new officers elected with him. Seated (right) Mr. F. D. Hesley, Senior Vice-President and standing (left to right) Mr. John J. Dement, Mr. William G. Robinson and Mr. Herman Minikine, Vice-Presidents.

The Robins Dry Dock & Repair Company is a subsidiary of Todd Shipyards Corporation.

Names and News

H. M. WALL ELECTED PRESIDENT

At the regular annual meeting of Wall Rope Works, Inc., held January 25, Harold M. Wall was elected president of the company. William F. Wall continues as chairman of the board, and Waldo Reiner as secretary-treasurer.

Harold M. Wall succeeds to the office held by his brother, the late C. Frederick Wall. He started with the company in 1910, was later made factory superintendent, subsequently becoming superintendent and general manager with headquarters at the Wall Mill at Beverly, New Jersey. In 1934 Mr. Wall was moved to the New York City office at 48 South Street as vice-president in charge of sales.

H. M. WALL

Mr. Wall is a grandson of the founder of the company which was established by the original William Wall in 1830.

JOHN A. KELLY

On February 14 John A. Kelly assumed the post of White Star Line's new district freight agent, working out of the offices of Harold de Golia, Pacific Coast manager. He was with McCormick Steamship Company as district freight agent for sixteen years prior to that time spending five years in Southern Pacific Company's freight department.

CAPT. HARRY MANNING

Word has been received that Capt. Harry Manning, well known in San Francisco and New York, has returned to duty as relief skipper for the United States Lines, after being badly injured when a plane he was piloting crashed last June. He was chief officer and later captain of the Panama Pacific ships Virginia and California when they were on the intercoastal run.

DAVID J. FRASER

An early March Seattle arrival will be David J. Fraser, who is returning to that city from Manila, where he has been general agent for States Steamship Company. Mr. Fraser, a former manager of the shipping department of Balfour, Guthrie & Co., Ltd., in Seattle, is rejoining Burchard & Fisken, Inc., where he served from 1924-1930 as Portland manager. He will be a member of the staff at the Seattle office.

Mr. Fraser was a director of the Merchants' Exchange of Portland and president of the Portland Steamship Operators' Association. He entered the States Steamship Company in 1930 as general agent at Hongkong, in 1937 being transferred to Manila, where he remained until leaving for Seattle to take up his new post.

TWO BAR PILOTS PASS

It is with regret that we write of the passing of two retired San Francisco Bar Pilots—**Capt. Magnus A. Anderson** and **Capt. Charles F. Gielow.** Capt. Anderson died on February 7 and Capt. Gielow on the 8th, after long careers spent at sea.

A veteran Norwegian shipmaster, Capt. Anderson came to San Francisco in 1882 on a sailing ship from Norway. He later commanded the famous Laura Pike, then the steamer Charles Nelson, the latter ship carrying troops and supplies to the Philippines during the Spanish-American War at the time of his command. He became a member of the Bar Pilots in 1901, and piloted Roald Amundsen's Gjoa into the harbor after her historic trip. At the time of his death he was 82 years of age and had been ill for some time.

Capt. Gielow, who was 77, originally came from Germany. He was master of many old Admiral Line vessels and before that of ships of other companies. In 1912 he was appointed bar pilot, retiring in 1933.

Cummins at Treasure Island

Cummins Engine Company's display at the National Motor Boat Show in New York proved so popular that the entire set-up has been shipped to San Francisco for display during the fair, which opened on February 18, 1939.

Front center—New 200 H.P. supercharged Diesel. Left to back, Model AMR-400 4 cylinder, 4 inch bore 5 inch stroke, 67 H.P. Diesel; Model AMR-600, 6 cylinder, 4 inch bore 5 inch stroke, 100 H.P. Diesel; Model HMR-600, 6 cylinder 4⅞ inch bore 6 inch stroke, 150 H.P. Diesel. Rear to front on right, Model IMR-600, 6 cylinder, 7 inch bore 10 inch stroke, 250 H.P. at 1000 r.p.m. Model AGD-400 small direct current 15 K.W. generating set; Model HGD-600, 50 K.W. generating set. Right front, cut-away model exclusive Cummins Diesel Fuel System.

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FOR LOW TEMPERATURE For all refrigeration requirements, aboard ship and on shore, be sure to have the protection of Mundet "Jointite" Corkboard and Moulded Cork Pipe Covering. This low temperature insulation gives maximum protection against heat infiltration. Economical, long-lasting, it is easily adaptable to individual requirements. Our engineering staff will be glad to help with specifications.

FOR HIGH TEMPERATURE In addition to Mundet products for low temperature, we carry a full line of the well known K & M asbestos and magnesia insulating products manufactured by Keasbey and Mattison. For full information on either low or high temperature insulation, write to the nearest Mundet office.

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Shipbuilding Division
(Union Plant)
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DRYDOCK AND ROUTINE REPAIRS: Richmond, Vermont, Vitus Bering, Dredge Texas, Condor, Makiki, M.S. H. T. Harper, Peter Lassen, Yorkmar, Hardanger, Point Salinas, Chipana, Manoa, Knud Rasmussen, Solana, Maui, Fr. Str. Wisconsin, J. C. Fitzsimmons, U.S.L.H.T. Sequoia.

THE CAMPBELL MACHINE CO.
Foot of Eighth St.
San Diego, Calif.

DRYDOCK AND ROUTINE REPAIRS: San Salvador, Sao Joao, Lone Wolf.

GENERAL ENGINEERING & DRY DOCK CO.
Foot of Fifth Avenue
Oakland, Calif.

DRYDOCK AND ROUTINE REPAIRS: M.S. Hawaiian Standard, Elna, Catherine Sudden, U. S. Cutter Shawnee, Mapele, Velox, W. R. Chamberlin.

HARBOR BOAT BUILDING CO.
Berth 264, Fish Harbor
Terminal Island, Calif.

NEW CONSTRUCTION: Two 40-foot high speed fishing cruisers. Completion date April 15, 1939.

DRYDOCK AND ROUTINE REPAIRS: Tuna boats Santa Marguerita and Magellan; Purse Seiners Costa Rica, Jackie Sue, City of San Pedro, Sea Rover, Star of San Pedro, Sea Breeze.

HONOLULU IRON WORKS
Honolulu, T. H.

DRYDOCK AND ROUTINE REPAIRS: President Pierce, President Taft, Tatuno Maru, U.S.C.G. Reliance and Tiger, Tug Mahoe, U.S.A.T. Ludington, Tug Mamo, Niagara.

LAKE WASHINGTON SHIPYARDS
Houghton, Wash.

NEW CONSTRUCTION: 200 foot steam geared turbine steel survey ship Explorer for U. S. Coast & Geodetic Survey. Estimated delivery date January 1, 1940.

DRYDOCK AND ROUTINE REPAIRS: C. G. Red Wing, Bureau of Fisheries Penguin, Tug Kingfisher.

LOS ANGELES SHIPBUILDING & DRY DOCK CORP.
Los Angeles Harbor
San Pedro, Calif.

DRYDOCK AND ROUTINE REPAIRS: Agwiworld, Barge San Pedro, Noyo, Huguenot, La Placentia, Santa Maria, Mericos H. Whittier, Catalina, Cabrillo.

MARE ISLAND NAVY YARD
Mare Island, Calif.

NEW CONSTRUCTION:

Swordfish, Submarine (SS193); keel laid October 27, 1937; estimated launching date April 1, 1939; estimated delivery date August 1, 1939.

Two harbor tugs, YT 133 and YT 134; keels laid September 29, 1938.

Garbage Lighter (YG 21); keel laid July 25, 1938.

Order received for construction of one submarine tender, Fulton (AS 11); dated June 30, 1938.

Order received for construction of one submarine, Tuna (SS203); dated June 30, 1938.

DRYDOCK AND ROUTINE REPAIRS: Chester, Vincennes, Hull, Case, Tucker, Shaw, Monaghan, Oriole, Turkey, Altair, Algorma, U.S.A.T. Grant, Pickerel, Permit.

THE MOORE DRY DOCK CO.
Oakland, Calif.

NEW CONSTRUCTION:

Hulls Nos. 193 and 194, two lighthouse tenders for Bureau of Lighthouses; LOA 174′ 10½″, beam molded 32′, depth 14′ 6″. Twin screw triple expansion engines; water tube boiler; 1000 horsepower. One for Pacific Coast; one for Great Lakes. Keel for first ship laid December 5, 1938. Launching date March, 1939.

Hulls Nos. 195 and 196, two cargo vessels for U. S. Maritime Commission; LOA 492′ 0″, LBP 465′, breadth molded 69′ 6″, depth molded 42′ 6″, SHP normal 8500, SHP max. 9350, dis. 17,600 tons, deadweight 11,926 tons; steam turbine propelled.

DRYDOCK AND ROUTINE REPAIRS: Vancouver (complete overhaul), Lahaina, Puerto Rican, Glacier, Frances, Blue Water, Tacoma, Canadian, Esther Johnson, Santa Monica, President Hayes, Claremont, Delawarean, Dauntless, Brunswick; Purse Seiners Robert B., Martindale, Alleta B., Arctic, Lorenz, Vashon, Western Traveler, Rio Del Mar, Radio, Margaret F., and Frances; Maunalei, Oregonan, Arizonan, Paul Luckenbach, Tug Hercules, S.C.T. Dodd, Angel Island, Carolinian, Sutter, Dalveen, Brookings, District of Columbia, R. J. Hanna, Columbine, Californian, Jane Christensen, Iowan, Saparoea, Pennsylvanian, Alabaman, Brunswick, Portland, Nome, J. A. Moffett, Komoku, Madoera, Canada, H. Dundas, Silverado, Salawati, St. Whl. Crockett, Hawaiian.

THE PUGET SOUND NAVY YARD
Bremerton, Washington

NEW CONSTRUCTION:

U.S.S. Wilson (Destroyer No. 408); standard displacement, 1500 tons; keel laid March 22, 1937.

U.S.S. Charles F. Hughes (Destroyer No. 428); standard displacement 1600 tons; order placed by Navy Department December 7, 1937. Keel laid January 3, 1939.

Ships authorized, work not started: Woban (YT138), harbor tug; Ala, (YT139), harbor tug; Barnegat (AVP10), seaplane tender; Biscayne (AVP11), seaplane tender; Monssen (DD436), destroyer.

DRYDOCK AND ROUTINE REPAIRS: Oklahoma, Arizona, Nevada, Pyro.

TODD SEATTLE DRY DOCKS, INC.
Harbor Island
Seattle, Wash.

DRYDOCK AND ROUTINE REPAIRS: Lena Luckenbach, City of Bremerton, M.S. Chippewa, Stanley A. Griffiths, Tug Prosper, Dorothy Luckenbach, M.S. Amerika, Yukon.

WESTERN BOAT BUILDING CO., INC.
2505 East 11th Street
Tacoma, Wash.

NEW CONSTRUCTION:

Hull No. 133, purse seine fishing boat 80′ x 20′ x 10′, powered by 200 H.P. Atlas engine, for stock. Launched December 1, 1938; completion date March 1, 1939.

Hull No. 134, tuna clipper 90′ x 24′ x 13′; 275 H.P. Union Diesel. Launching date February 15, 1939.

Hull No. 135, Tahoma, small diesel ferryboat powered by 135 H.P. Atlas engine; launched February 1, 1939; completion date February 25, 1939.

Hull No. 136, purse seine fishing boat 96′ x 22′, powered by 240 H.P. Atlas Diesel engine. Keel laid January 30, 1939; launching date March 1, 1939.

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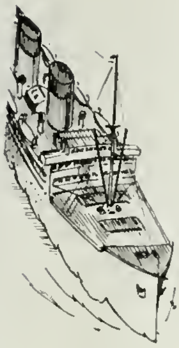

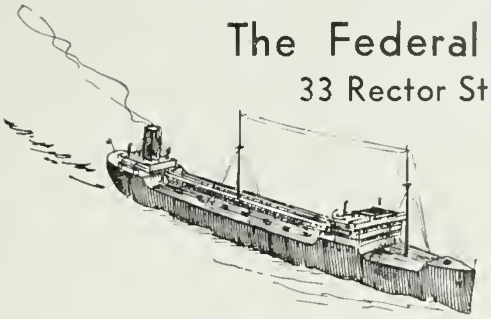

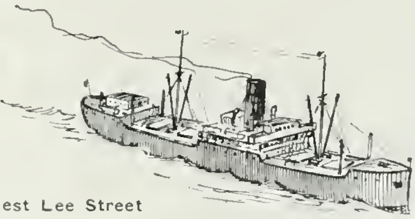

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NEW CONSTRUCTION:

Ten standard coal barges 175′ x 26′ x 11′, for builder's account.

Fifteen coal barges with double steel bottom 195′ x 35′ x 11′, for Central Barge Co., Chicago.

One relay barge 104′ x 34′ x 8′ for the Panama Canal. Delivery date January 1, 1940.

BATH IRON WORKS
Bath, Maine

NEW CONSTRUCTION: **Hull No. 163; DD396 Jouett; 1850-ton destroyer for U.S. Navy;** date of contract September 19, 1935. Keel laid March 26, 1936. Launching date September 24, 1938; delivered January 25, 1939.

Hulls Nos. 170-171, DD409, Sims, and DD410, Hughes, two 1500-ton destroyers for U. S. Navy; contract date October 12, 1936; keels laid July 15 and September 15, 1937, respectively; launching dates, indefinite; delivery dates April, 1939, and June, 1939, respectively.

Hulls Nos. 177 and 178, DD423 and DD424, two 1620-ton destroyers for U. S. Navy. Contract date September 30, 1937; delivery dates April and June, 1940, respectively.

Hulls Nos. 180-181, DD429 and DD430; two 1620 ton destroyers for U. S. Navy. Contract dated August 15, 1938; delivery in 28 and 30 months, respectively.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Fore River Yard
Quincy, Mass.

NEW CONSTRUCTION:

CV7, Wasp, Airplane Carrier for U. S. Government; keel laid April 1, 1936.

Hulls Nos. 1467, Panama; 1468, Ancon; and 1469, Cristobal; three passenger and freight steamers for Panama Railroad S.S. Co.; 486 feet x 64 feet x 38 feet 6 inches; 16½ knot speed. **Keels laid,** Nos. 1467 and 1468, October 25, 1937; No. 1469, November 15, 1937; launching dates September 24, 1938, December 10, 1938, and **March, 1939.**

Hulls Nos. 1470 and 1471, two 1500-ton destroyers for U. S. Government; delivery dates March, 1940 and May, 1940.

Hulls Nos. 1474, 1475, 1476 and 1477, four freight vessels for American Export Lines, Inc.; 450′ B.P. x 66′ x 42′3″; 16½ knots; geared turbines and water tube boilers. Keel laid No. 1474, November 10, 1938; No. 1475, December, 1938.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Sparrows Point Yard
Sparrows Point, Md.

NEW CONSTRUCTION:

Hull No. 4334, L. P. St. Clair, 13,000 dwt. oil tanker for Union Oil Co. of Calif. Contract signed March, 1938. Launching date December 10, 1938; **delivery date approximately March 1, 1939.**

Hulls Nos. 4329, 4330, 4331; three 16,300 dwt. ton tankers for Standard Oil Co. of N. J.; 18 knots speed. Contract signed January 3, 1938.

Hulls Nos. 4332 and 4333; two 16,000 dwt. tankers for Socony Vacuum Oil Co. Contract signed February, 1938.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Staten Island Yard
Staten Island, N. Y.

NEW CONSTRUCTION:

Hulls Nos. 8001, Navajo; 8002, Seminole; and 8003, Cherokee—three U. S. Navy fleet tugs. No. 8001, keel laying date December 12, 1938; launching date September 15, 1939; delivery date January 25, 1940. No. 8002, keel laying date December 16, 1938; launching date November 15, 1939; delivery date March 25, 1940. No. 8003, keel laying date December 23, 1938; launching date January 15, 1940; delivery date May 25, 1940.

BOSTON NAVY YARD
Boston, Mass.

NEW CONSTRUCTION:

DD402, Mayrant, and DD403, Trippe, two light destroyers for United States Navy; LBP 334′, beam 35′6″ depth 19′8″; keels laid April 15, 1937; launched May 14, 1938; estimated delivery dates January, 1940, and February, 1940, respectively.

DD415, O'Brien, and DD416, Walke, two destroyers; LBP 341′, beam 36′, depth 19′8″ keels laid May 31, 1938; launching date April, 1939; delivery dates May, 1940, and July, 1940.

DD425, Madison, and DD426, Lansdale, two destroyers; 341′0″ x 36′0″ x 19′8″. Keel laying date December 19, 1938; launching date April, 1940; delivery dates August and October, 1940.

DD433 and DD434, two destroyers, 341′0″ x 36′0″ x 19′8″, contract awarded July 23, 1938. Keel laying date June, 1939; launching date April, 1940; completion dates June and August, 1941.

BROOKLYN NAVY YARD
Brooklyn, N. Y.

NEW CONSTRUCTION:

CL 50, **Helena, light cruiser;** L.B.P. 600′ beam 61′7¾″, standard displacement 10,000; geared turbine engines; express type boilers; keel laid December 9, 1936; launched August 27, 1938; estimated delivery January 2, 1940.

BB 55, **North Carolina, battleship;** L.B.P. 714′ 0″, beam to outside armor 108′ 0″, std. displ. 35,000 tons; geared turbine engines; express type boilers. Keel laid October 27, 1937; estimated launching date May 1, 1940; contract delivery September 1, 1941; estimated delivery date October 15, 1941.

CHARLESTON, S. C., NAVY YARD
Charleston, S. C.

NEW CONSTRUCTION:

One harbor tug, Massasoit (YT131); LOA 110′, beam 24′; authorized August 12, 1937; keel laid July 25, 1938; launched December 13, 1938.

One harbor tug, Heekon (YT141); LOA 100′, beam 25′; authorized July 7, 1938.

One harbor tug, Nokomis (YT142); LOA 100′, beam 25′; authorized July 7, 1938.

Four destroyers.

The two 124′9″ and 65′ harbor tugs have been completed.

DEFOE BOAT & MOTOR WORKS
Bay City, Mich.

NEW CONSTRUCTION:

Hulls Nos. 72 and 73; two diesel electric harbor cutters for Coast Guard; 110′ x 26′ 6″; powered by 1000 S.H.P. General Motors engines; steel construction. Delivery date April, 1939.

THE DRAVO CORPORATION
Engineering Works Division
Pittsburgh, Pa., and Wilmington, Del.

NEW CONSTRUCTION:

Hulls Nos. 1465, one welded cargo box barge 100′ x 26′ x 6′ 6″ for stock; 165 gross tons.

Hulls Nos. 1483-1489, seven welded ash removal barges for Dept. of Sanitation, City of N. Y.; 150′ x 37′ x 12′ 9″; 3871 gross tons.

Hull No. 1492, one welded steel coal barge 126′ x 34′ x 17′ for stock; 673 gross tons.

Hulls Nos. 1503-1504, two welded steel oil barges 195′ x 35′ x 9′ 6″ for stock; 978 gross tons.

Hull No. 1526, one welded steel coal barge 175′ x 26′ x 10′ 8″ for stock; 472 gross tons.

Hulls Nos. 1534-1538, five welded steel coal barges 175′ x 26′ x 10′ 8″ for stock; 2360 gross tons.

Hulls Nos. 1538-1540, two welded 3 pocket dump scows 115′ x 28′ x 7′ 6″ for stock; 240 gross tons.

Hull No. 1543, one 25-ton floating crane for Navy Dept. Bureau of Yards & Docks; 335 gross tons.

Hulls Nos. 1544-1545, two welded steel hull 125 H.P. workboats for stock; 42 gross tons.

Hulls Nos. 1546-1555, ten welded steel coal barges 175′ x 26′ x 10′ 8″ for stock; 4720 gross tons.

Hulls Nos. 1556-1557, two welded steel oil barges 195′ x 35 x 10′ 6″ for Canal Barge Co., New Orleans, La.; 1060 gross tons.

ELECTRIC BOAT CORP.
Groton, Conn.

NEW CONSTRUCTION:

Hull No. 29, Sargo (SS188); standard displacement 1450 tons; keel laid May 12, 1937; launching date June 6, 1938; **delivered February 7, 1939.**

Hull No. 30, Saury (SS189); standard displacement 1450 tons; keel laid June 28, 1937; launching date August 20, 1938; delivery date April, 1939.

Hull No. 31, Spearfish (SS190); standard displacement 1450 tons; keel laying date September 9, 1937; launching date October 29, 1938; delivery date June, 1939.

Hull No. 33, Seadragon (SS194); 1450 tons; keel laying date April 18, 1938; delivery date December, 1939.

Hull No. 34, Sealion (SS195); 1450 tons; keel laying date June 20, 1938; delivery date February, 1940.

Hull No. 35, Tambor (SS198); standard displacement 1475 tons; keel laying date January 16, 1939; delivery date January, 1941.

Hull No. 36, Tautog (SS199); standard displacement 1475 tons; **keel laying date**

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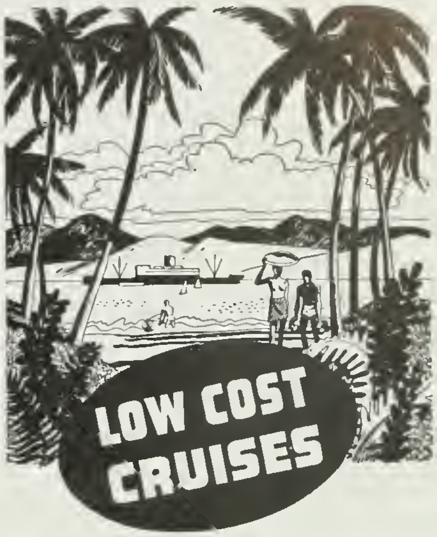

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March 15, 1939; delivery date March, 1941.

Hull No. 37, Thresher (SS200); standard displacement 1475 tons; keel laying date May 15, 1939; delivery date May, 1941.

THE FEDERAL SHIPBUILDING AND DRY DOCK COMPANY

Kearny, N. J.

NEW CONSTRUCTION:

Three destroyers, DD397 Benham, DD398 Ellet and DD399 Lang, 1500 dis. tons; keels laid September 1, 1936, December 3, 1936, and April 5, 1937, respectively; launching dates April 16, June 11 and August 27, 1938, respectively. **DD397 delivered February 1, 1939.**

Two destroyers, DD411 Anderson and DD412 Hammann; keels laid November 15, 1937, and January 17, 1938, respectively; **launching date February 4, 1939.**

Hulls Nos. 151, 152 and 153, three tankers for Standard Oil Co. of New Jersey; keels laid, No. 151, July 1, 1938; No. 152, July 15, 1938. **No. 151 launching date March, 1939.**

Hulls Nos. 154-159, six C-2 cargo vessels for U. S. Maritime Commission. Keels laid, No. 154, August 25, 1938; No. 155, September 20, 1938; **No. 156, January 3, 1939.**

Hulls Nos. 160 and 161, two torpedo boat destroyers for the United States Navy.

Hulls Nos. 162-167, six C-3 cargo vessels for U. S. Maritime Commission.

LEVINGSTON SHIPBUILDING CO.

Orange, Texas

NEW CONSTRUCTION:

One all welded oil barge 92′ x 27′ x 6′ for stock. **Delivered February, 1939.**

One all welded boiler barge 84′ x 28′ x 7′ for Sun Oil Company, Beaumont, Tex. **Delivery date March, 1939.**

One all welded oil barge 173′ x 39′ x 8′ 6″ for Higman Towing Co., Orange, Tex. **Delivered February, 1939.**

One all welded oil barge 165′ x 36′ x 9′ 9″ for Edwards Transportation Co., Houston, Tex. **Delivered February, 1939.**

One all welded 10″ hydraulic dredge 60′ x 26′ x 6′; diesel and diesel electric; for J. G. McMullen, Orange, Tex. **Delivered February, 1939.**

One all welded tugboat 80′ LOA, 22′ beam molded, 9′ 6″ depth molded, for W. G. Coyle & Co., New Orleans, La. Powered with 550 H.P. Cooper-Bessemer diesel engine. **Delivery date March, 1939.**

MANITOWOC SHIP BUILDING CO.

Manitowoc, Wis.

NEW CONSTRUCTION: **Six hopper barges** 158′ x 26′ x 10′, capacity 800 tons, for Marine Transit Co., Chicago, Ill. Delivery date spring, 1939.

One river towboat 100′ x 25′ x 8′, for Marine Transit Co., Chicago, Ill. Delivery date spring, 1939.

THE MARYLAND DRYDOCK CO.

A Subsidiary of Koppers Company,
Baltimore, Maryland

NEW CONSTRUCTION:

Hull No. 194, single screw steel derrick lighter for U. S. Engineer Office, N. Y. District. LOA 115′ 9⅜″, LBP 110′, beam overall 30′ 8¾″, beam molded 30′, depth molded 11′ 9″, frame spacing throughout 21″, load displacement 438 tons, mean load draft molded 9′ 2½″. Keel laying date October, 1938; launched December 29, 1938; delivery date April 15, 1939.

NEWPORT NEWS SHIPBUILDING & DRYDOCK CO.

90 Broad Street, New York

NEW CONSTRUCTION:

H362, light cruiser, CL49, St. Louis, keel laid December 10, 1936; launched April 15, 1938.

Hulls Nos. 363-364, two destroyers, Nos. 413, Mustin, and 414, Russell; keels laid December, 1937; launched December 8, 1938; delivery dates April and June, 1939.

Hull No. 369, twin screw mail, passenger and cargo liner for United States Lines Co.; length 723′, beam 92′, depth 45′. Keel laid August 22, 1938.

Hulls Nos. 370, 371 and 372, three oil tankers for Standard Oil Company of New Jersey; gross tonnage about 11,500 tons; L.B.P. 525′, breadth molded 75′, depth molded 39′. Keel laid, No. 370, January 16, 1939.

Hulls Nos. 373, 374, 375 and 376, four single screw cargo vessels for United States Maritime Commission; turbine propulsion; gross tonnage about 9000 tons; length 435′, breadth 63′, depth 40′6″. Keels laid, Nos. 373 and 374, November 14 and November 28, 1938.

Battleship 58, Indiana, for U. S. Navy.

THE NEW YORK SHIPBUILDING CORPORATION

Camden, N. J.

NEW CONSTRUCTION:

One destroyer tender for U. S. Navy; order placed December 27, 1937.

One seaplane tender for U. S. Navy; order placed December 27, 1937.

One destroyer tender for U. S. Navy; order placed October 14, 1938.

One seaplane tender for U. S. Navy; order placed October 14, 1938.

One battleship for U. S. Navy; order placed December 1, 1938.

PORTSMOUTH, N. H., NAVY YARD

Portsmouth, N. H.

NEW CONSTRUCTION:

Six submarines, Sculpin, Squalus, Searaven, Seawolf, Triton and Trout.

THE PUSEY & JONES CORP.

Wilmington, Del.

NEW CONSTRUCTION:

Hull No. 1070, one steel hopper dredge, Chester Harding; 2,500 cubic yard capacity; length overall 308′2″, length B.P. 300′0″, breadth molded 56′0″, depth molded 29′0″. Contract date February 14, 1938; keel laid May 15, 1938; launched January 20, 1939; delivery May 10, 1939.

Hull No. 1071, one steel lighthouse tender, Lilac Class, for Dept. of Commerce, Bureau of Lighthouses. Gross tonnage approximately 700 tons. Keel laid October 17, 1938; completion date July 5, 1939.

Two streamlined diesel tugs for Curtis Bay Towing Company; powered by 320 H.P. Enterprise engines; cost $200,000.

SUN SHIPBUILDING AND DRY DOCK COMPANY

Chester, Pa.

NEW CONSTRUCTION:

Hulls No. 172, 173 and 174, three tankers for Standard Oil Co. of New Jersey; steam turbine; 525′ x 75′ x 39′; 16,300 dwt. Keel laying dates April 18, May 31 and July 14, 1938; **launching dates, Nos. 173 and 174, March 4** and April 22, 1939, respectively; **No. 172 delivered February 6, 1939;** delivery dates, Nos. 173 and 174, April 11 and May 15, 1939, respectively.

Hulls Nos. 175-180, six single screw diesel cargo vessels, C-2 design, for U. S. Maritime Commission; equipped with Sun-Doxford engines. **Keel laying dates** July 25, 1938; July 26, 1938; August 27, 1938; August 28, 1938; January 14, 1939; **March 6, 1939.** Delivery dates July 4, 1939; September 2, 1939; November 1, 1939; December 31, 1939; March 1, 1940, and May 1, 1940.

Hull No. 181, single screw steam turbo electric drive tanker for Atlantic Refining Co.; 521′ x 70′ x 40′. Keel laid November 21, 1938; delivery date March 1, 1940.

Hulls Nos. 182, 183, 184 and 185, four single screw diesel cargo vessels for U. S. Maritime Commission, C-3 design. Equipped with Busch Sulzer engines. Delivery dates February 21, 1940; April 21, 1940; June 20, 1940; and August 19, 1940.

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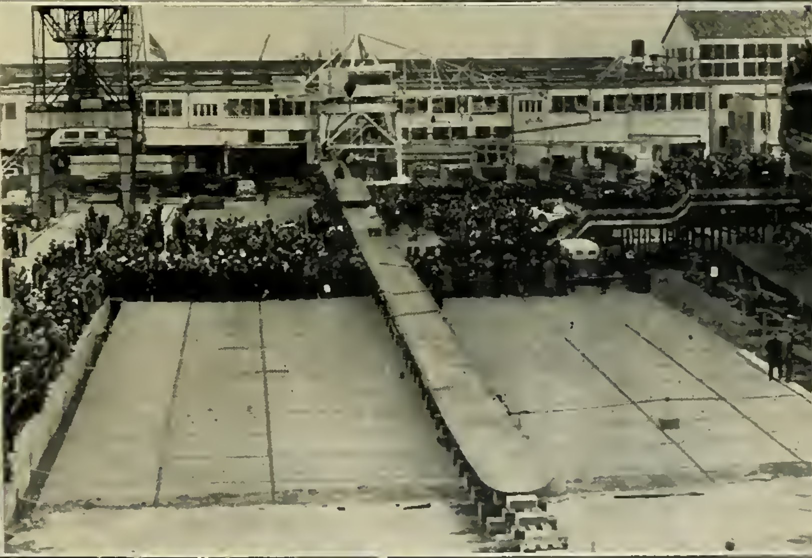
PACIFIC MARINE REVIEW

APRIL 1939



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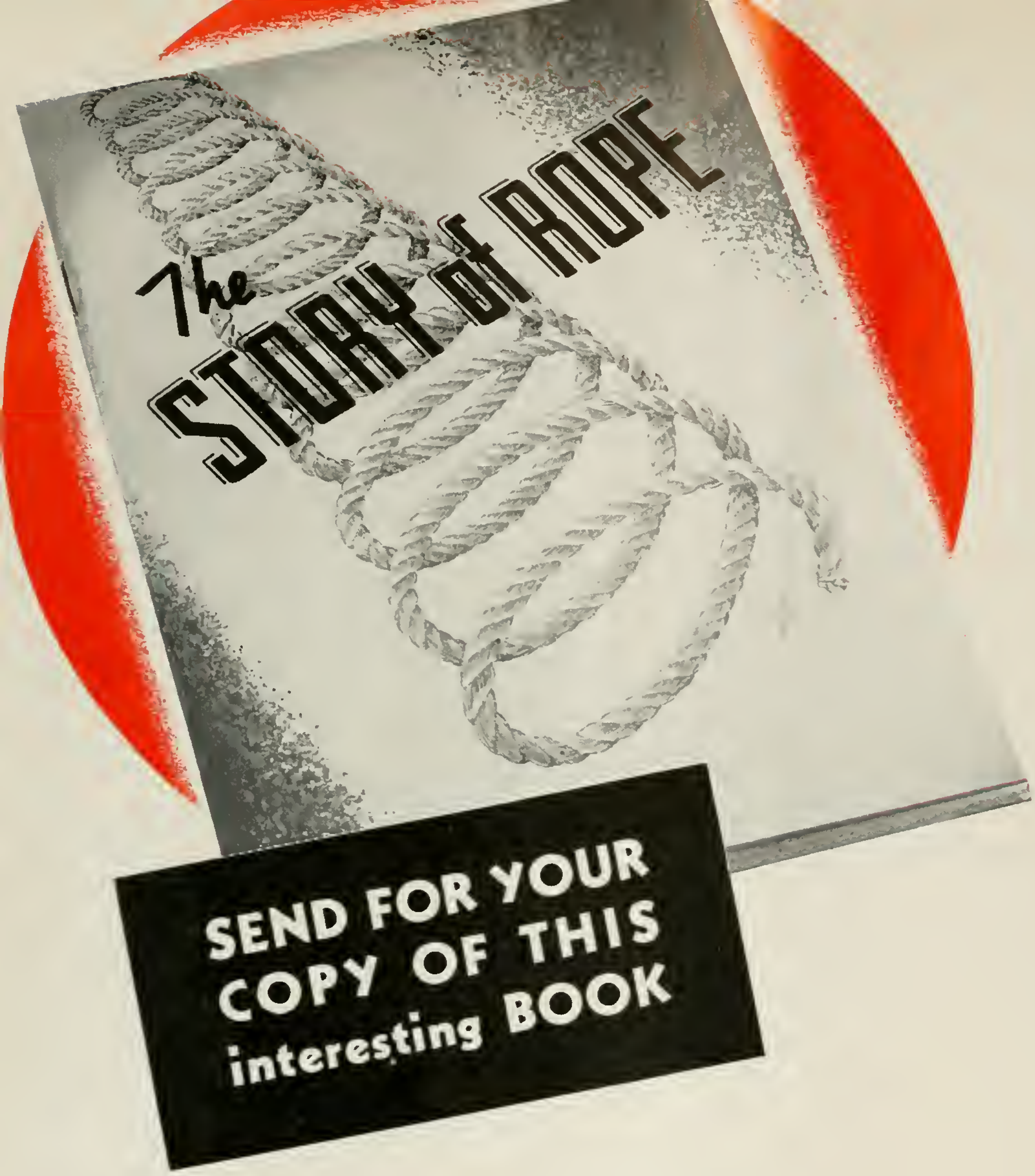

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PACIFIC MARINE REVIEW

APRIL, 1939

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TABLE OF CONTENTS

Editorial Comment:

Pacific Coast Shipbuilding 33

First Rivet in Renaissance of Shipbuilding in Pacific Coast Shipyards 35

Robert Lyons Hague—A Friend of Seafarers 39

Your Problems Answered 40
By "The Chief"

Steady as You Go! 43
Air-Borne Damage to Sea-Borne Cargoes
V Damage Prevention Methods
By Oliver D. Colvin, Werner H. E. Hahne and Mark R. Colby

New Union Oil Company Tanker L. P. St. Clair 46

An Interesting All Welded Steel Hull Shallow Draft River Towboat 50

Steam Jet Air Ejectors 52

New Laboratories Benefit Marine Industries 54
By William H. Lowe

Steam Generating Equipment on High Speed Tanker Cimarron 56

On the Ways 60
Ships in the Making

Deceleration and Acceleration of Ships at Sea 61
III Intermittent Deceleration
By D. W. Dickie

Building in American Yards 70

Miscellaneous: Engineers' Licenses, 42; New R.P.M. DELO, 53; Another Salvage Job Well Done by Haviside, 64; General Purpose Steam Turbines, 74; New Gasoline Driven Windlass, 76; Short Wave Boat, Shore, Airplane Network, 76; New Lightweight Jack, 76; An Efficient Carloader, 78; A New Ventilating Device, 78; Marine Fire Line Globe and Angle Valves, 80; New C-O-Two Nozzle, 80; Direct-Current Marine Motors, 80.

PUBLISHED AT 500 SANSOME STREET . . . . SAN FRANCISCO

Entered as second class matter June 20, 1913, at the post office, San Francisco, under the Act of March 3, 1879. Published on the 1st of each month. Advertising and editorial forms close on the 15th. Subscription price, one year: Domestic, $1.50; foreign, $2.50; two years: Domestic, $2.50; foreign, $4.00; three years: Domestic, $3.00; foreign, $5.50; single copies, 25c. Chas. F. A. Mann, Northwest Representative, 1110 Puget Sound Bank Bldg., Tacoma, Washington. New York Office, Suite 404-405-406, Two Hundred Broadway, Telephone COrdlandt 7-3579.

In New York City copies of Pacific Marine Review can be purchased at the news stands of I. Goldberg, 42 Broadway; Harry Nash, 17 Battery Place; Philip Mandara, Greenwich Street and Battery Place. In Washington, D. C., at the news stand of the Carlton Hotel, 16th and K Streets.

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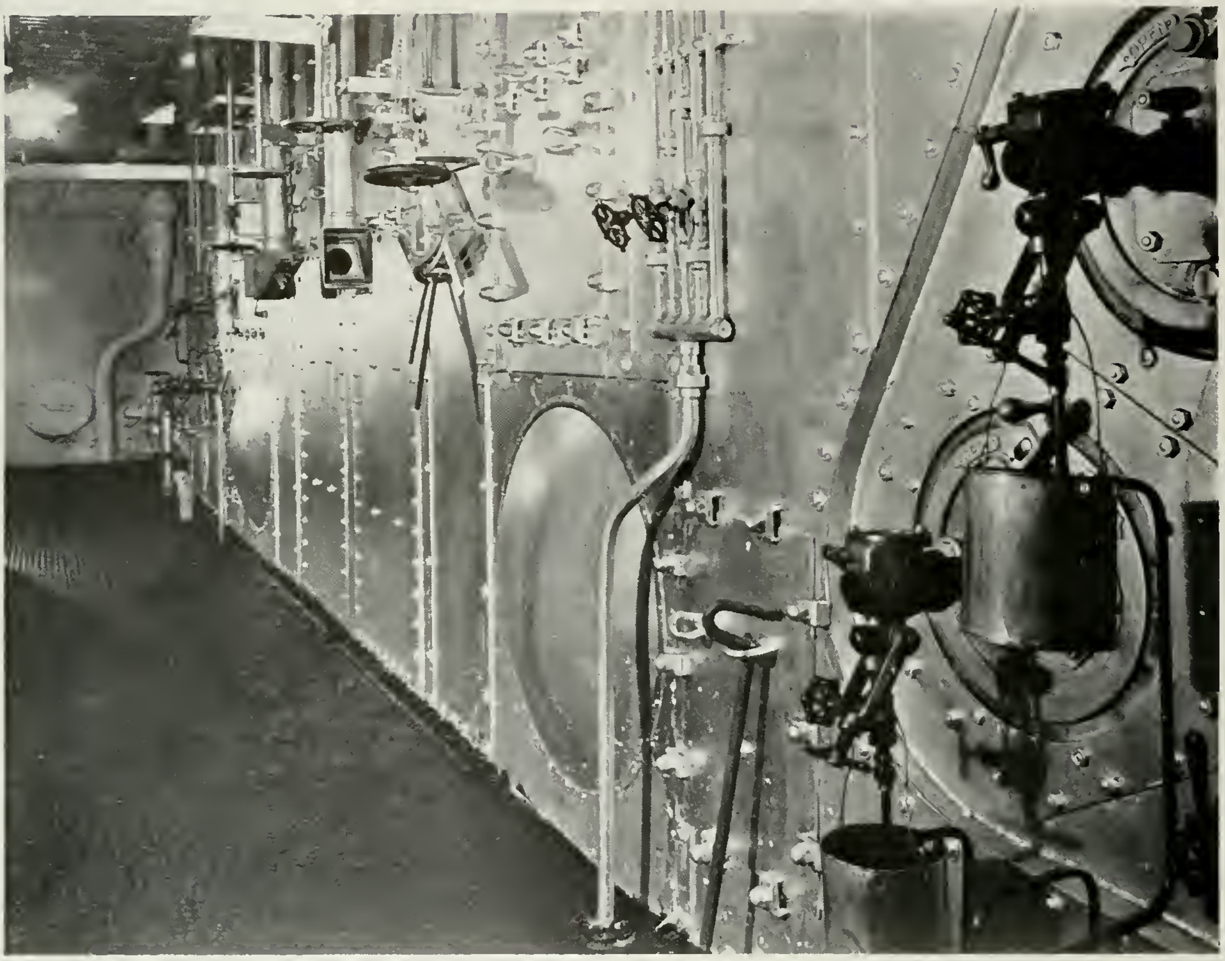

Boiler room of the new Union Oil Company tank steamer fitted with Foster Wheeler marine steam generators.

"L. P. ST. CLAIR"

THE NEWEST of many high efficiency tank steamers recently put into commission for the American Merchant Marine is the "L. P. St. Clair", built at the Sparrows Point yard of the Bethlehem Steel Company. The ship is of most up-to-date design and equipment, carrying most effective apparatus throughout in order that reliability, efficiency and minimum maintenance may give maximum ton-miles per year at lowest cost.

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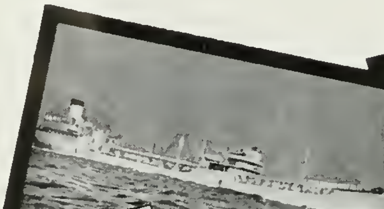

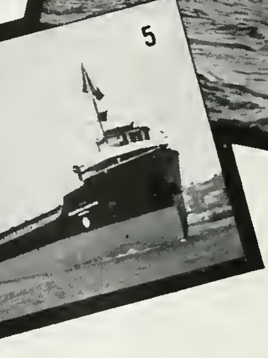

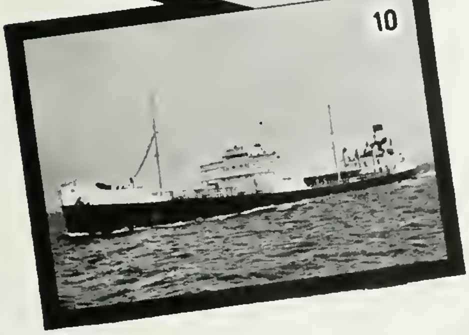

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This installation is regarded as the latest step in shipboard radio facilities and is therefore in every respect worthy of its place on board the last word in oil tankers. The equipment meets all United States Government and International radio requirements, and has type approval of the Federal Communications Commission.

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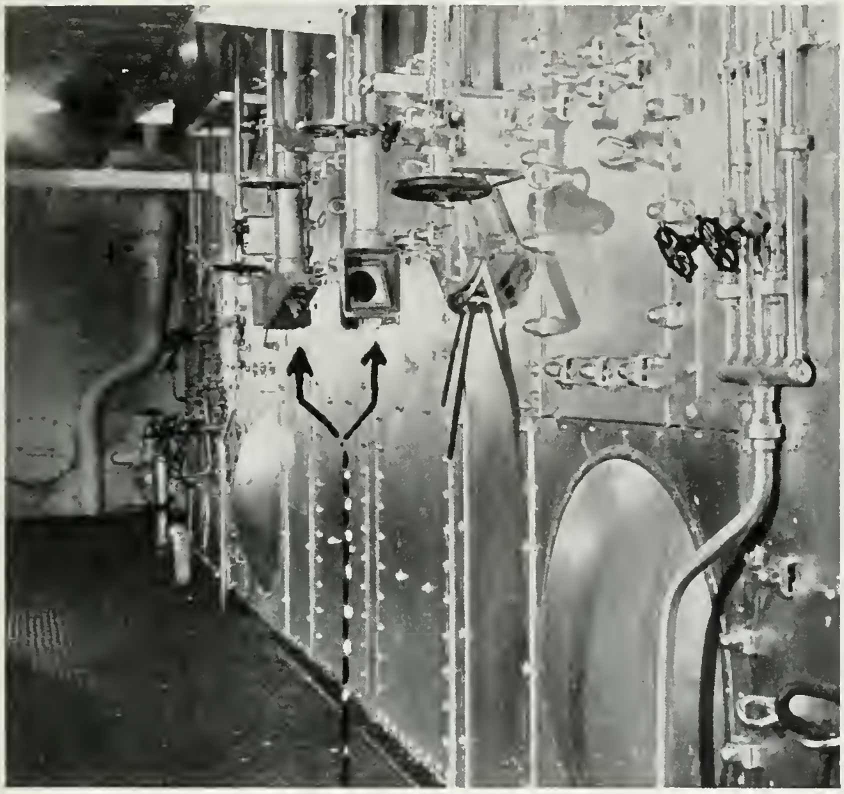
WAGER

Smoke Indicators

on the S S L. P. St. Clair



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Here are the WAGER SMOKE INDICATORS on the Foster Wheeler boilers as installed on Union Oil Company's new tanker L. P. St. Clair. . . . Note arrangement allows checking of combustion conditions of both boilers from one position at operator's station.

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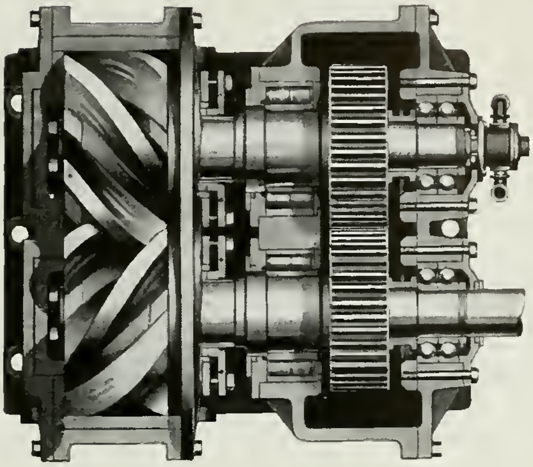

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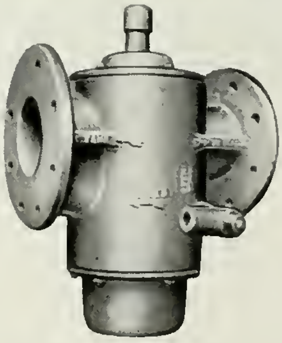

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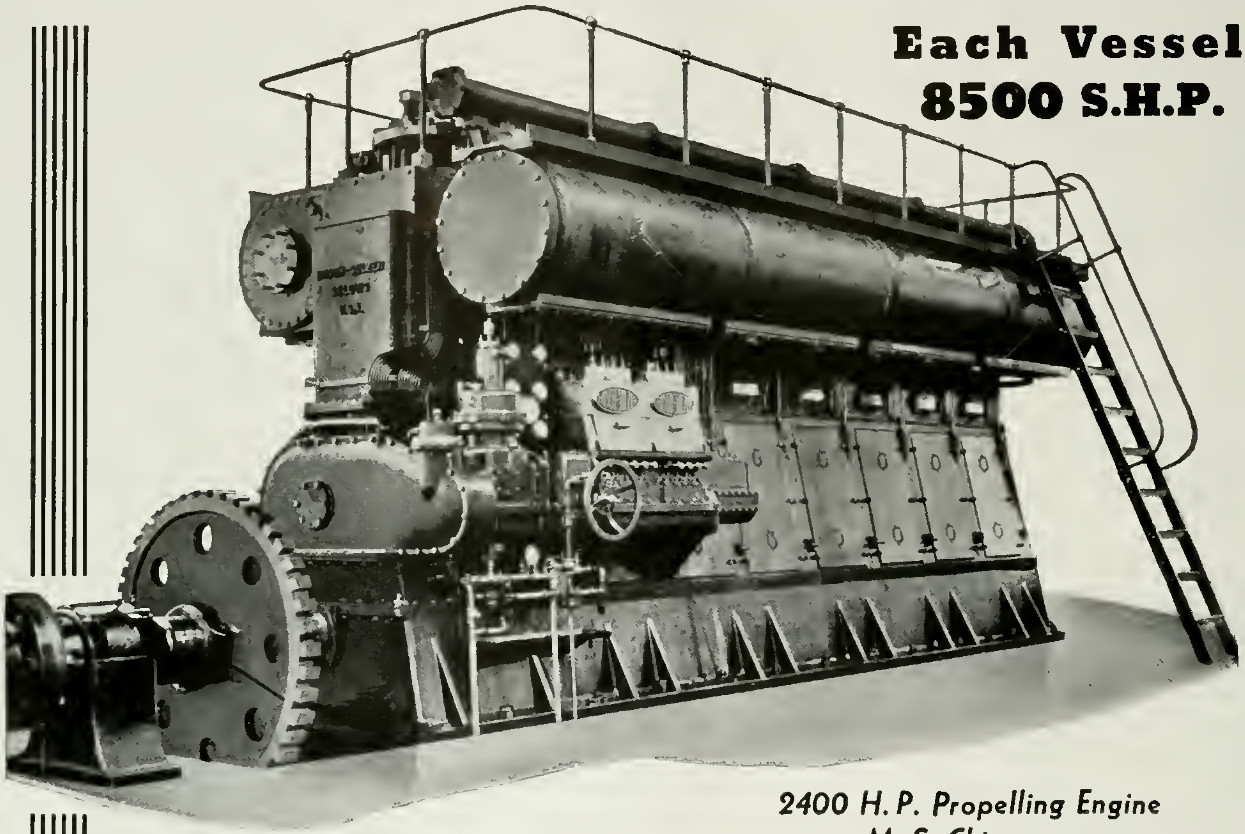

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These engines are of the same simple trunk piston construction as those in the motor ferries "Chippewa" and "Kalakala" in continuous, successful operation since 1932 and 1935, respectively.

This same proven design and arrangement is available for powers up to 30,000 H.P. per shaft . . . 60,000 S. H. P. with twin screws.

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PACIFIC MARINE REVIEW

VOLUME XXXVI APRIL, 1939 NUMBER 4

Pacific Coast Shipbuilding

The cover and the following pages of this issue of Pacific Marine Review describe and illustrate the first Pacific Coast shipyard keel laying for a vessel of the U. S. Maritime Commission program for the rehabilitation of the American Merchant Marine fleet. This vessel is the first of two, and to date these two are the only U. S. Maritime Commission vessels contracted to be built in a Pacific Coast yard.

The Pacific Coast should regard this contract as only a beginning, and should further consolidate its position and its program for future efforts to get more of these ships to build in Western shipyards.

Much work is being done toward this goal. That of the recent National Defense Conference of the American Legion, held at Reno, Nevada, March 11 and 12, with delegates from eleven Western States, is a good example. After considerable debate that conference unanimously adopted three resolutions of constructive benefit to Pacific Coast shipbuilding. Stripped of the whereas sections, these resolutions are:

(1) "That the U. S. Maritime Commission be asked to make available immediately more bids on the 'C' 1, 2 and 3 type ships and be directed to make every effort to allocate not less than 25 per cent of all future shipbuilding to Pacific Coast yards due to the urgencies of National defense."

(2) "That this conference does urge upon Congress the immediate enactment of H. R. 1010" (the resolution to make available a subsidy to intercoastal vessels determined by the U. S. Navy to be in fact potential naval auxiliary vessels).

(3 "That this conference urges upon the President of the United States the vital importance and necessity for appointing as a member of the U. S. Maritime Commission a representative of the Western area whose background and training gives him an intimate personal knowledge of Pacific shipping problems."

These resolutions are substantially the program of the Coastwise United Committees for the promotion of Pacific Coast shipbuilding.

This is a good program and one which every citizen can support for both selfish and public interest.

Large payrolls distribtued in any district benefit commercially every citizen in that district.

No other industry distributes in payroll so large a proportion of total costs as does shipbuilding.

Let's get busy and bring more shipbuilding to Pacific Coast yards.

Hunter's Point Dock

For some reason best known to themselves, certain interests are trying to force a purchase of the graving docks at Hunter's Point by the U. S. Navy. The owners of the docks do not wish to sell.

The U. S. Navy, so far as we can find out, has no desire to buy.

The commercial shipowners, marine underwriters and marine men in general would much prefer to have these fine docks under commercial ownership and catering to commercial ship operators.

This is the largest dock in the United States under commercial operation. Let's keep it there.

Joseph A. Moore

"I want to feel that our Company, and the men who work with us are building, not only for the Maritime Commission, but for the future welfare of our Community and our Country—that's my job and the job of every man connected with the construction of these vessels."

A First Rivet —

Renaissance of Shipbuilding in Pacific Coast Shipyards

A Keel is Laid - - Two Ships are Launched

On March 18, a happy throng of men, women and children swarmed over the Oakland, California, shipyard of the Moore Dry Dock Company to listen in on several notable speeches and to witness a keel laying and a launching.

A lighthouse tender was launched and christened Walnut.

A keel was laid for a cargo vessel, the first keel laid on the Pacific Coast for the merchant shipbuilding program of the U. S. Maritime Commission.

Mr. Joseph A. Moore, president of the Moore Dry Dock Company, speaking through a mike connected with loud speakers at various points in the yard and with a National radio network, acted as master of ceremonies and introduced the various speakers. His opening words struck a happy response in the minds of all present:

"This," said he, "is **your** day, **your** celebration as much as it is ours, and I welcome you all to our yard this morning. Your presence is evidence of the intense interest all of us have in the revival of Pacific Coast Shipbuilding and I am sure it is your hope, as strongly as it is mine, that during the years ahead many fine ships will be turned out, not only in this yard, but in **all** the Coast shipyards. Right here in this plant we've already built ninety vessels and we can do it again with the help and cooperation of all concerned. That means profitable employment, it means community prosperity and it means happiness."

He then paid tribute to the organization and the men who have cooperated in securing for Moore Dry Dock Company the contract to build two large cargo vessels.

Short speeches were made by Hon. T. W. Fitzsimmons, vice mayor of Oakland; Hon. Angelo Rossi, mayor of San Francisco; Dr. H. G. Waters, California State Commander of American Legion; Marshall Dill, president, San Francisco Chamber of Commerce; and A. Lundberg, president, Oakland Chamber of Commerce.

At 10:30 a. m. the controls were switched to Washington, D. C., and Admiral Emory S. Land, chairman of the U. S. Maritime Commission, spoke over an N. B. C. network as follows:

"Heartiest greetings to you in the keel laying ceremonies! **This** is a great day for the West Coast.

"Some of you realize rather painfully how shipbuilding declined in your section after the World War. A great many of you do not know that the decline was so extreme that no large ocean-going merchant vessels have been built on the West

OUR COVER

Our cover illustration on this issue is symbolic of the renaissance of Pacific Coast shipbuilding.

At the top is shown a general view of the Moore Dry Dock Company plant, Oakland, California, showing, in center, the new building slip and the two lighthouse tenders, the Walnut and the Fir, under construction, and in the foreground other vessels on the dock or at piers. At the right, inserted in this view, is a close-up snap of the U. S. Maritime Commission's distinguished riveting gang, comprising, left to right, David Currier, H. E. Frick, Reginald Laughlin and E. C. Mausshardt.

Just below this gang, in the view of the new slip, a keel is laid for the first C-3 cargo vessel to be built on the Pacific Coast. Note the paved building slip. At the left, the lighthouse tender Walnut is shown afloat just after launching. This launching was followed shortly by that of the sister tender Fir.

At bottom, a large group of distinguished visitors stand as Charles F. Bulotti, San Francisco's beloved tenor, sings "The Star Spangled Banner" over the N. B. C. national network.

And so our program of Pacific Coast shipbuilding is started. "Let's keep going!"

Admiral Emory S. Land
Chairman U. S. Maritime Commission

Miss Virginia Hughes, sponsor of lighthouse tender Walnut, her family and Joseph A. Moore.

Coast since that War. We have been struggling to rectify this for years.

"Today the tide has turned!

"With the laying of these keels West Coast enterprise, engineers and shipbuilders once more begin the fabrication of big ships for blue waters.

"Heretofore, the Maritime Commission found it impossible to make any West Coast awards. Either no bids were received or else they were too high to compete successfully.

"My hat is off to Joe Moore, president of the Moore Dry Dock Company, for his constructive efforts and his contribution to the revival of shipbuilding in the West. During the weeks that passed while his bids were being studied, I know he must have been discouraged more than once. It was a tough problem to solve. He cooperated in every way with the Commission. It was obvious that he had the interests of the whole West Coast at heart.

"Today the Maritime Commission has 66 ships under construction. This is the beginning of the program to restore the American Merchant Marine to its proper place among the maritime nations of the world. These ships that you are building in California are a part of that program. I hope it will be possible in the future to make additional awards to West Coast yards. It is up to you!

"We are building ships. They are necessary for the success of our foreign trade and essential to our national defense. We would like to have a financially healthful and prosperous merchant marine. There is but one way to that goal. That is **greater patronage** for American flag ships, both by shippers and by travelers.

"Today our vessels are carrying less than 30 per cent of our foreign commerce. About 70 out of every 100 Americans crossing the North Atlantic travel on foreign flag ships. There is no justification for this situation. It arises principally from the failure of our shippers and our citizens who travel to give thought to the problem. We cannot expect to transport on American flag ships all our foreign commerce or all the American citizens who travel upon the seas. But we **can** expect to carry a substantial percentage of both. We **must** do so if we are to succeed in reviving those maritime traditions of this country, which once were the envy of the world.

"On this occasion, with the keels of these ships being laid before your eyes, I want to leave that thought in your mind. These ships, and others building, will be the new American merchant marine. Our slogan: **'Travel and Ship under the American Flag.'** Let's go!"

The controls were switched back to the Moore yard and Charles Bulotti, San Francisco's beloved tenor, accompanied by Uda Waldrop, distinguished pianist, sang "The Star Spangled Banner."

Joseph R. Sheehan, formerly executive director of the U. S. Maritime Commission, and now president of the American President Lines, directed the thought of his hearers to the significance of this event in the history of the American Merchant Marine.

"No person," said he, "could witness this scene today at the yard of the Moore Dry Dock Company in Oakland, California, without a feeling of deep gratification and without sensing that this occasion has greater significance than that which is apparent. We shall soon see the driving of the first rivet and the laying of the keel of the first vessel to be constructed on the Pacific Coast as part of the construction program of the United States Maritime Commission in its undertaking of rehabilitating the American Merchant Marine.

"There is nothing particularly spectacular or unusual connected with the average ceremony of laying the keel of a ship. Ceremonies of that sort are held many times every year in maritime countries. That of today, however, is to be regarded as tangible evidence that the United States of America is again to take its position, in no uncertain way, as one of the leading maritime nations of the world, and that all sections of the country are to participate in the great building program which is necessary to accomplish that end. We rejoice in this event not so much for what it is, but for what it signifies, and our pleasure would be greatly tempered if we thought that West Coast participation began and

Distinguished guests in the grandstand for the launching and the keel laying ceremonies. Dr. H. G. Waters, California State Commander, American Legion, at "mike."

ended with the construction here of these two ships.

"The naval construction which is now being undertaken is of great importance to our country, but for complete national defense we need much more than ships of war. We must have naval bases, shipyards, repair yards, fuel stations, and finally merchant vessels, which are the only media through which the Navy may have available supply ships, hospital ships, mine layers, mine sweepers, and troop ships. No Navy can be efficient without such auxiliary craft.

"Furthermore, our commerce, amounting as it does to around six billion dollars, is so important to our economy that we must take every precaution to prevent its disruption in time of war. There never again can be a war, no matter what nations may be involved, which will fail to affect our country, and any such outbreak, even with us neutral, would affect our foreign trade almost immediately, and any dislocation of our commerce would result in the curtailment or stoppage of the flow of some essential commodities. This would affect our industries and possibly bring about unemployment for many.

A happy throng of guests swarmed over the Moore yard on March 18. This view shows a corner of the plate shop.

"Our prestige, our defense, our commerce, indeed our whole national existence, depend to a major degree upon the possession and maintenance of an adequate merchant marine. The Maritime Commission has already planned it, the shipyards on the East and West Coasts have already started to construct it, our American seamen are skilful and efficient enough to operate it, and I am convinced that the national pride and business sense of all Americans will impel them to support it."

Mr. Moore, in the concluding speech over the N. B. C. network, thus summed up in masterly fashion the keynote of the day:

"This celebration is a symbol of faith; the faith of the United States Maritime Commission and ourselves in our ability to build these ships, to build good ships at a reasonable cost. If we keep that faith there'll be more ships to build, more work to do, and there'll be more prosperity in this area.

"I want to feel that our company and the men who work with us are building, not only for the Maritime Commission, but for the future welfare of our community and our country, and that isn't any one man's job; it's my job and it's the job of every man connected with the construction of these vessels.

"The stage is all set for the work. We've built the finest shipbuilding slip—and we'll build another if there's work for it—and at very considerable expense, we've made every necessary physical addition to our plant and equipment.

"We start the job with enthusiasm, and when it is finished may we all have a justifiable pride in a job well done."

The connecting keel plate was laid and the first rivet driven by a "most

(Page 58, please)

Miss Mason, sponsor of the lighthouse tender Fir, her family and Joseph A. Moore.

Robert Lyons Hague 1880-1939

Marine America has lost a master ship operator — a wise counsellor — a brave builder and a great-hearted friend.

Robert Lyons Hague— A Friend of Seafarers

Robert L. Hague, a vice president and director of the Standard Oil Company of New Jersey (Del.), and an international figure in shipping, died suddenly at his home in the Ritz Towers, 465 Park Avenue, shortly after 8 a.m. on Wednesday, March 8, following a brief illness. An outstanding leader in America's maritime industry, Mr. Hague's death came as a distinct shock to his friends and associates on land and sea in all parts of the world.

Robert Lyons Hague was born at Lincoln, Rhode Island, on March 2, 1880, and received his early technical training at Worcester Polytechnic Institute. His first seagoing experiences were gained as a member of the crew on fishing boats off the Grand Banks and on the Sewell four-masted bark Susquehanna.

Later he became interested in engineering and learned the machinist trade in the Worcester plant of Washburn-Moen (American Steel & Wire and U. S. Steel Corporation). He turned to railroading and became a locomotive engineer of the New York, New Haven & Hartford Railroad.

In 1904 he left railroading and started his maritime career with the American-Hawaiian Steamship Company and there rose through all the licensed grades of the engineering department. Subsequently he was brought ashore as assisant superintendent in charge of construction for the American-Hawaiian Line on the Pacific Coast.

In 1909 he become assistant superintending engineer for the Standard Oil Company of California and a series of rapid promotions soon made him marine superintendent in charge of operations, repairs, design and construction. With America's entry into the World War, Mr. Hague was selected by the then U. S. Shipping Board as its director of construction and repairs, in which capacity he had complete control and supervision of repairs to all Shipping Board vessels, first on the Pacific Coast, and later in Washington. To this responsibility was added that of reconditioning German ships for passenger service.

In July of 1920 Mr. Hague joined the Standard Oil Company (N. J.), as manager of its Marine Department. Upon the Marine Department being formed into the Standard Shipping Company in 1927, he was made vice president and general manager of that company and in 1932 became its president. With the merger of the Standard Shipping Company and the Standard Oil Company of New Jersey in December, 1934, he was appointed general manager of the Marine Department. On December 31, 1937, he was made a vice president and director of the Standard Oil Company of New Jersey (Del.) In this capacity he signed with the United States Maritime Commission on January 3, 1938, agreements whereby his company undertook the construction of twelve high speed National-Defense Features tankers. He attended the launching of the second and third of these twelve vessels, one of which was sent into the water at Kearny, N. J., at 8 a.m. on Saturday, March 4; the other, at Chester, Pa., at noontime the same day.

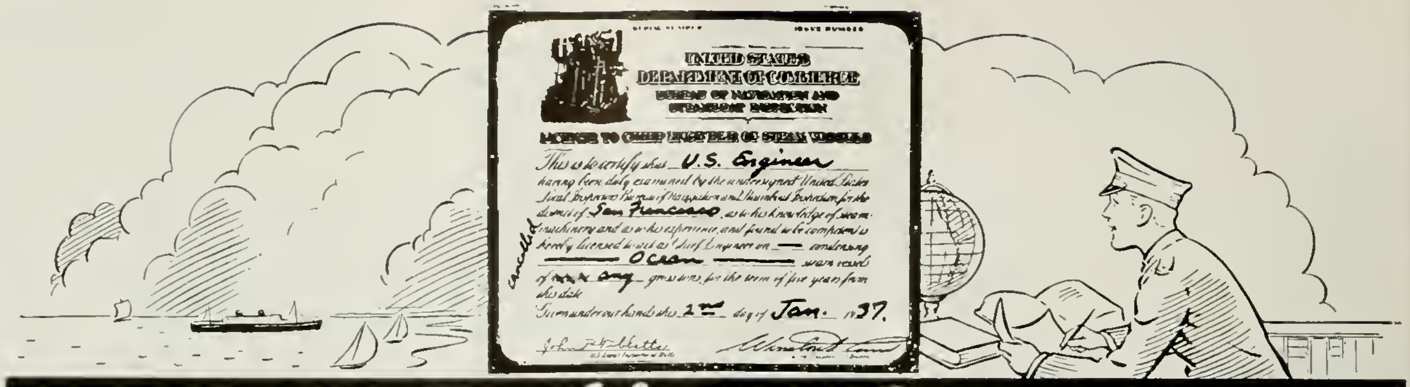
He held the rank of Lt. Commander in the United States Naval Reserve and had also been designated as Grande Ufficiale of the Crown of Italy.

He was a director of the American Bureau of Shipping; a trustee of Webb Institute of Naval Architecture; a trustee of the Worcester Polytechnic Institute; a member of the Society of Naval Architects and Marine Engineers, the Engineers Club and the American Petroleum Institute. His other affiliations included the Institute of Marine Engineers, the India House, the Downtown Athletic Club, The Lambs, The Players, Larchmont and Indian Harbor Yacht Club, Metropolitan Club, Whitehall Club, Marine Society of New York, Ship Model Society, Marine Museum of the City of New York, John Ericsson Society, and Chiselers Club. He was also a member of Occidental Lodge No. 22 F. & A. M., San Francisco, California.

For several years past he had been an active figure in the International Lifeboat Racing Association and was one of its former presidents, this organization having as its purpose the advancement of the safety of life at sea.

Always the sailor, Mr. Hague had an extensive and unique group of marine curios, marine paintings and ship models, and gathered together one of the finest private collections in the country.

The sudden passing of Robert (Bob) Hague was a great shock to his many personal friends on the Pacific Coast.



UNITED STATES
DEPARTMENT OF COMMERCE
BUREAU OF NAVIGATION AND
STEAMBOAT INSPECTION

LICENSE TO CHIEF ENGINEER OF STEAM VESSELS

This is to certify that U.S. Engineer having been duly examined by the undersigned United States Local Inspectors [illegible] for the district of San Francisco, as to his knowledge of steam machinery and as to his experience, and found to be competent is hereby licensed to act as Chief Engineer on — condensing Ocean steam vessels of any gross tons, for the term of five years from this date.

Given under our hands this 2nd day of Jan. 1937.

Cancelled

Your Problems Answered

by "The Chief"

The word "Cancelled" was inscribed on face of the above license at the direction of the Bureau of Marine Inspection and Navigation. As used here it means "Specimen Copy."

AUXILIARIES III

THE EJECTOR

QUESTION

What are some of the names applied to devices using the jetting force to move water, gas, air or steam?

ANSWER

Some of these names are:

The **Ejector** uses the steam jet to lift bilge water overboard and other water moving requirements. This device is also used to pump up the vacuum in the condenser and is sometimes called the **Radio-jet.** When it is used ahead of the dry air pump to increase or augment the vacuum it is called the **Augmenter.**

The **Injector** uses the steam jet force to feed water against boiler pressure.

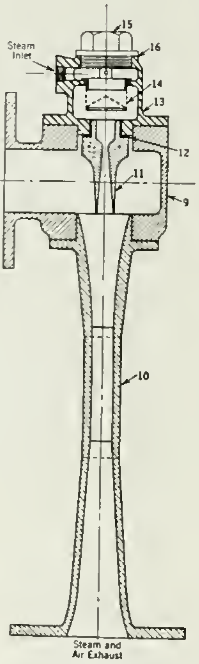
By far the most frequently used aboard ship is the **Ejector** for vacuum. It has now almost entirely supplanted all other forms of vacuum pumps in new installations.

QUESTION

Describe a steam jet air ejector.

ANSWER

Refer to Figs. 4 and 5.



Typical single-stage steam jet ejector with parts described as follows:

9. Suction Body
10. Diffuser
11. Steam Nozzle
12. Steam Nozzle Washer
13. Steam Chamber
14 Steam Strainer
15. Steam Chamber Nut
16. Steam Chamber Nut Washer

5

Steam at high pressure, 100 lbs. or more, enters steam space in 13 after passing through strainer 14 to remove pipe scale or other entrained foreign matter which might plug up the small orifice in the nozzle body, 11. The drop in pressure imparts a very high velocity to the steam jet, perhaps as high as 2500 to 3500 feet per second. Issuing from the nozzle, it sweeps with it any gas or air in the chamber of the suction body, 9, and imparts to the gas or air a high velocity, so that the mixture enters the diffuser body at a greatly reduced but still high velocity. Passing through the throat of the diffuser, the velocity is slowed down by the gradually increased area of the opening and the energy of velocity is partly converted to pressure energy, raising the pressure by compression of the gases from the vacuum to atmospheric pressure.

Usually two ejectors are used in series, one discharging into the suction of the other.

QUESTION

What is the jet or ejector condenser?

ANSWER

After each ejector a small surface condenser is generally used to cool the gases and remove their heat of compression, and to condense the steam used by the jet.

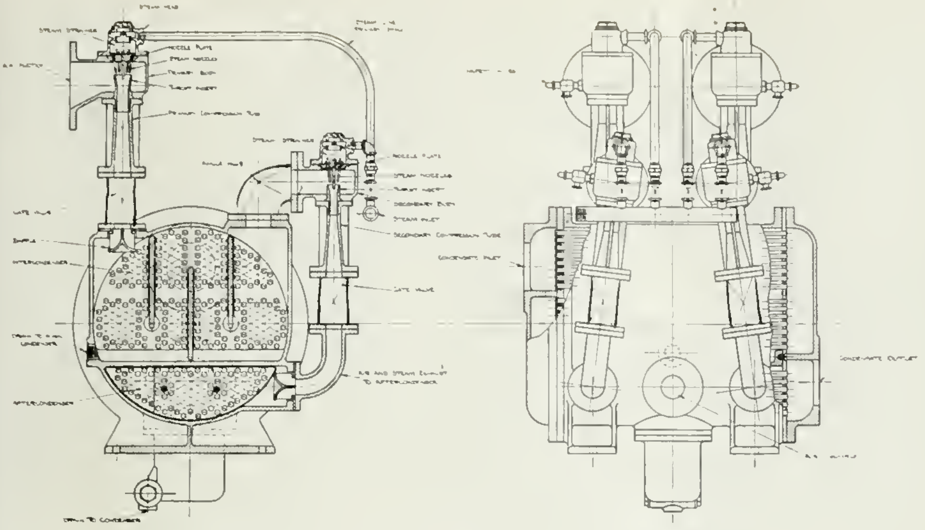
With the two stage or two ejectors in series, the condenser in between the ejectors is called **inter** and the one following the second ejector is called the **after** condenser. Condensate is pumped through the tubes of these condensers, thus saving the heat in the ejector steam. These condensers may be combined into one casing by having a pressure barrier, thus using the same tubes and cooling water. See Fig. 15.

QUESTION

Why are twin or triple element ejector sets used?

ANSWER

It is highly desirable that the



Twin-element, two-stage ejector with combined surface inter and after condensers (multiple nozzle type)

vacuum pumping equipment be arranged for immediate cut over to a spare in case of failure. The common type of failure in operation is plugging up of the nozzle. Thus it is customary to have one set of a pair running, the other ready to run when cut in. These are called twin or duplex units. If the capacity requires more running at a time, multijet ejectors may be used, or three or four units in each stage may be fitted, leaving one or two for spare.

QUESTION

If condensate is used for inter and after condenser cooling, what can be done when ship is standing by with practically no condensate from the main condenser coming through to the hot well?

ANSWER

It is necessary to fit the hot well with a recirculating pipe, which, by opening a valve, will allow the condenser to suck back in a limited amount of water from the hot well. See Fig. 32. Thus the condensate pump will draw it out again and force it through jet condensers. The water should be sprayed into the condenser to prevent erosion of tubes or strains from temperature changes.

QUESTION

The after condenser drip can be drained into the hot well by gravity, but what can be done with the drain from the inter condenser where the pressure will be 10 to 15 inches of vacuum? It will not drain to hot well, and if connected to condenser it will short circuit the first stage ejector and blow back into condenser.

ANSWER

This is taken care of by connecting this inter condenser drain to the main condenser through a vertical loop of pipe, the bottom of the loop being from 8 to 15 feet below the point of connection to the main con- and holds back gas or air blow into denser. This loop fills with water condenser while at the same time letting water drain through. This could also be done with a vacuum trap.

QUESTION

What vacuum can be maintained, using a two stage ejector?

ANSWER

This depends on so many factors not subject to the ejector that a definite answer is difficult. Three-quarters inch of mercury absolute pressure should be reasonable, but the slightest leaks in the system at this high vacuum would reduce this materially.

Our next article will discuss the subject "Shall auxiliaries be motor driven or steam driven?"

Question from the Ships

"The Chief," Pacific Marine Review
Sir:

I would appreciate it very much if you would send me the names of the best marine engineering books as described in your letter of the February issue of Pacific Marine Review.

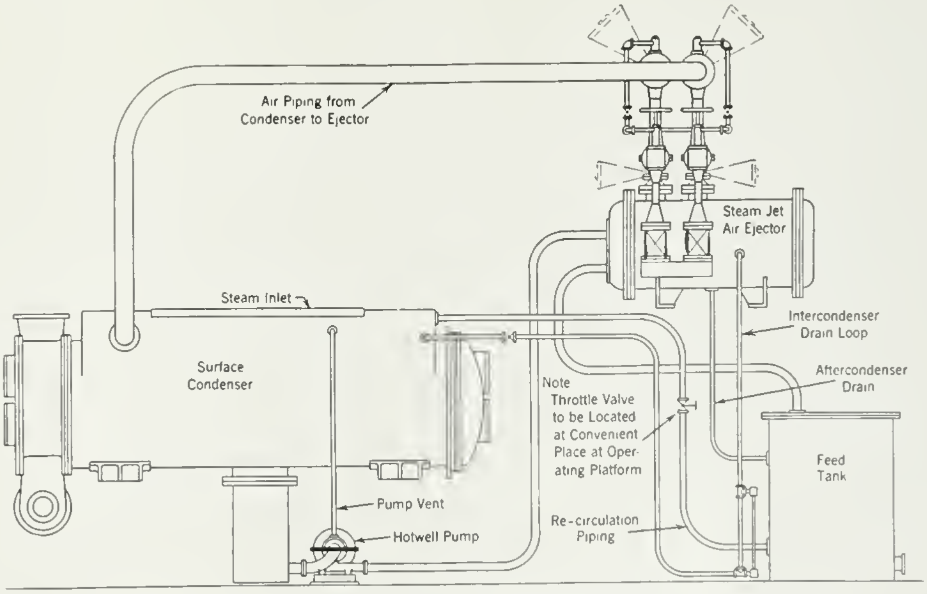
Thanking you for giving me the opportunity to receive these books, I remain,

Thankfully,
WTS, Savannah

ANSWER

There have been so many requests for information on books on marine engineering that it has been necessary to prepare a list and to make recommendations with little or no knowledge of the inquirers' basic education or experience. We are therefore suggesting as follows: (See footnote below for names of publishers.)

Publisher A: D. Van Nostrand Company, Inc.; Publisher B: McGraw Hill Book Co., Inc.; Publisher C: John Wiley & Sons, Inc.; Publisher D: Ocean Publishing Co.


Air Piping from Condenser to Ejector
Steam Jet Air Ejector
Steam Inlet
Surface Condenser
Intercondenser Drain Loop
Aftercondenser Drain
Note Throttle Valve to be Located at Convenient Place at Operating Platform
Feed Tank
Pump Vent
Hotwell Pump
Re-circulation Piping

Arrangement of twin-element two-stage ejector in typical marine installation where condensate is recirculated from feed tank.

For advanced practical information on marine engineering:

"Verbal Notes and Sketches for Marine Engineer Officers"; 13th edition; $25.00; in two volumes. Hundreds of charts and sketches; over 1300 pages; by J. W. M. Sothern. Publisher A.

"The Marine Steam Turbine"; $15.00; by above author. Nearly 1,000 pages and many sketches. Publisher A.

For more theoretical treatment of the subject we suggest the following:

"Marine Power Plant," by Lawrence B. Chapman; $4.00; 320 pages; 113 illustrations. Publisher B.

"Steam Power Plant Engineering," by G. F. Gebhardt; $6.00; 1036 pages; 714 illustrations. Publisher C.

For the elementary treatment of the subject, these books may be selected:

"Practical Steam Engineering," by James A. Moyer; $2.50. Consists of 20 separately bound assignments for home study. Publisher C.

"Blue Book of Facts of Marine Engineering," 1936 edition; $3.00. Publisher D.

"Marine Steam Turbines," by James A. Moyer; 24 paper bound assignments or lessons for home study; 25 cents each. Publisher C.

"Practical Heat," by Terrell Croft; 695 pages, 628 illustrations, on the heat engineering of a plant, not necessarily marine; $5.00. Publisher B.

"Steam Turbines, Principle and Practice," by Terrell Croft; 347 pages, 276 illustrations, covering the elements of the steam turbine, not necessarily marine; $3.00. Publisher B.

For handbooks full of tables and brief descriptions with many definitions, covering a wide field, look at one or more of these:

"Marine Engineers' Handbook," by Frank Wart Sterling; 1450 pages; $7.00. Publisher B.

"Mechanical Engineers' Handbook," by Lionel S. Marks; 2264 pages; 1300 illustrations; $7.00. Publisher B.

"Mechanical Engineers' Handbook," Volume II, Power, by Robert T. Kent; 1226 pages; $5.00. Publisher C.

Engineers' Licenses

The following list shows licenses granted during the month of February to engineer officers of the merchant marine at Pacific Coast offices of the Bureau of Marine Inspection and Navigation:

Name and Grade	Class	Condition
SEATTLE		
Earl H. Rodgers, Chief Eng.	OMS, any GT	O
Neil G. Sporre, Chief Eng.	OMS, any GT	O
Marshall Alonzo, 1st Asst. Eng.	OSS, any GT	RG
Robert I. Moncrieff, 1st Asst. Eng.	OSS, any GT	RG
Gault R. Weatherby, 3d Asst. Eng.	OSS, any GT	O
SAN PEDRO		
Hubert C. Everingham, 2nd Asst. Eng.	OSS, any GT	RG
Denzel R. Carpenter, 3d Asst. Eng.	OSS, any GT	O
SAN FRANCISCO		
Max W. Hicks, Chief Eng.	OSS, any GT	RG
Henry A. Rettig, Chief Eng.	OSS, any GT	RG
Joseph R. Shafer, 1st Asst. Eng.	OSS, any GT	RG
Robert L. Stapp, 2nd Asst. Eng.	OSS, any GT	O
Christopher Black, 2nd Asst. Eng.	OSS, any GT	O
Raymond W. Frobe, 2nd Asst. Eng.	OSS, any GT	RG
Donald P. Hanrahan, 2nd Asst. Eng.	OSS, any GT	RG
Glenn G. Guffy, 3d Asst. Eng.	OSS, any GT	O
Andrew J. McKenna, 3d Asst. Eng.	OSS, any GT	O
Paul M. Van Aken, 3d Asst. Eng.	OSS, any GT	O
Harry G. Reader, Chief Eng.	OMS, any GT	O
John R. McKellar, Chief Eng.	OMS, any GT	O
Raymond Russell, Chief Eng.	OMS, any GT	O
William E. Augros, 3d Asst. Eng.	OMS, any GT	O
HOQUIAM		
Bjarne N. Nilsen, 3d Asst. Eng.	OMS, any GT	O

Abbreviations: GT is gross tonnage; RG is raised grade; O is original license; OSS is ocean steamer; OMS is ocean motorship.

Building Your Engineering Library

I find it very difficult to recommend books to readers without knowing something about their educational background. In writing in for this kind of information please give some details about yourself, such as approximate age, license held, duties aboard ship, grade of school last attended, and specialty leanings, such as diesel, steam, electrical, boilers, heat theory or other interests.

Every man should have half a dozen good books, well selected, that he can pick up at odd moments, and read a paragraph or chapter and learn something each day. His books should include one good handbook with the wide range of information in more or less tabulated form.

Readers should learn to browse for selective reading; that is, to step into a library or technical book shop and look at book after book, glancing at the illustrations and the table of contents; and occasionally finding one that interests, to borrow or buy it for further reading.

Readers should also make a collection of instruction or descriptive pamphlets on machines or equipment as may come to hand.

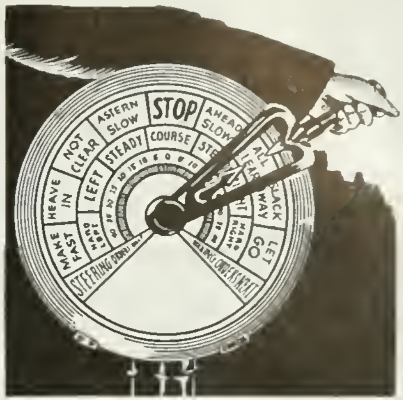
When you see a machine with which you are not familiar, write to the manufacturer for illustrations or descriptions.

Books can be obtained through the Pacific Marine Review or from the local bookshop in your city.

Good books, like good tools, are your best investment.

Steady as you go!

KNOWLEDGE IS THE STRAIGHT COURSE TO ADVANCEMENT



A DEPARTMENT FOR DECK OFFICERS

AIR-BORNE DAMAGE TO SEA-BORNE CARGOES

V - DAMAGE PREVENTION METHODS

By OLIVER D. COLVIN, WERNER H. E. HAHNE and MARK R. COLBY

● **Conditioning of Cargoes Before Shipment**

It has been seen that many agricultural products are liable to heat spontaneously and to deteriorate when they contain excessive moisture. Most of these goods when **sufficiently dry** could be shipped in a tightly sealed cargo space on long ocean voyages and would not need any ventilation or care whatever. The presence of hot or cold bulkheads would not cause a dangerous transfer of moisture.

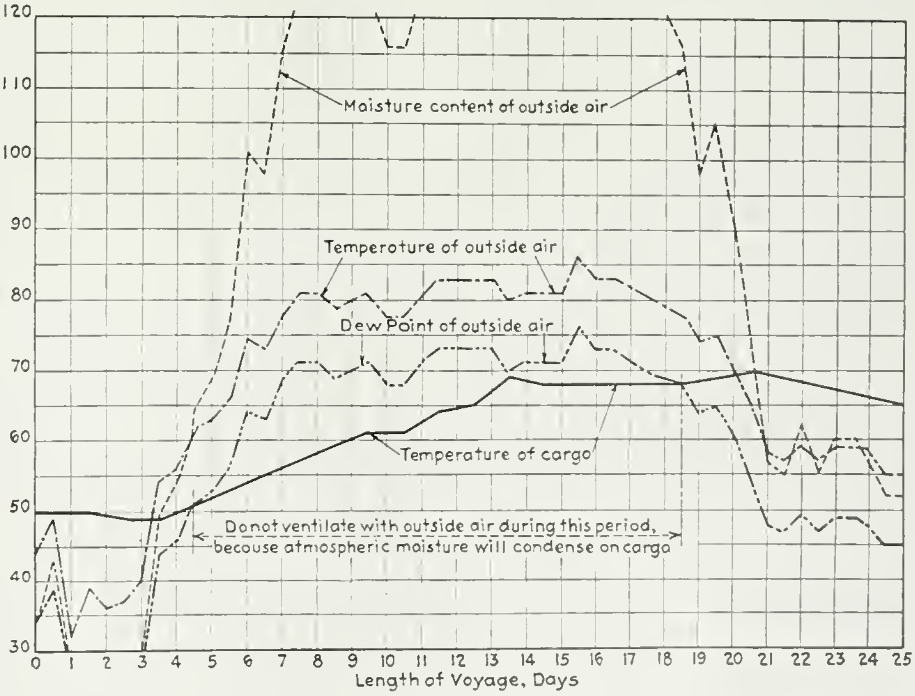
Little, if any, moisture would tend to evaporate from the cargo and any excessive moisture in the air of the closed hold would be absorbed by the cargo. Therefore, no condensation could occur in cold weather on the cold metal of the ship.

A logical procedure would be, therefore, to dry all goods liable to heat spontaneously below their safe moisture limits and then carry them to their destination without any protective measures whatever. Evidently such cargoes must not release any harmful odors, and also they must be prevented from taking on any moisture by absorption, rain, etc., after they have been dried and before they are stowed in the ship's hold.

The United States Department of Agriculture and several American steamship companies have made large-scale experiments along these lines with grain and other cargoes, proving that this statement is correct. In view of this experience many trades have recognized such procedure as the only solution to their troubles and numerous drying plants for grain, seed, nuts and numerous other goods have been built and are being developed all over the world.

The canning industry has had a similar experience. Experiments made in 1932 by the Forest Products Laboratory at Vancouver, British Columbia, indicated that the box shooks of which the wooden boxes are made should contain less than 17 per cent of moisture in order to prevent the rusting of the tin cans inside during long ocean voyages. As a consequence the British Columbia Lumber and Canning Industry has been seasoning box shooks

CARE OF CARGO AT SEA



Temperature and dew point log on Canadian intercoastal route showing danger of condensation on cold metal cargo.

accordingly and this practice is spreading to other canning centers. S. J. Duly of London recently verified these findings. Obviously the box shooks and filled boxes must not be allowed to absorb moisture before shipment and during the ocean voyage.

The indications are, however, that practical and economic reasons will prevent a rapid growth of such sound practices. A grain drier that may be perfect and remunerative in the southern United States is likely to be much too expensive to operate in the interior of the East Indies or elsewhere. Therefore, it is safe to assume that many producing areas in overseas countries will have to continue taking chances on the spoilage of their goods, rather than install expensive drying equipment.

Consequently, the shipowner must watch very carefully to make sure that the goods are in a safe condition for carriage. It is not enough that the goods are "Received in apparent good order and condition" at the ship. As an example, rice may look entirely sound at that time, but its moisture content may be so high that it is bound to deteriorate during a lengthy ocean voyage. The officer receiving the cargo should by all means insist that the moisture content of the dangerous cargo be determined. This is the best way for a carrier to protect himself from unjustified claims and this practice would eliminate many lengthy arguments in court. A method to handle such cargo more safely will, however, be described in the later sections of this paper.

The thorough student of this subject will at once realize why the legal situation regarding the carriage of hygroscopic goods is so complicated. This paper cannot deal with legal details, but it should be noted that the question of liability when carrying dry hygroscopic cargoes is different from the one when carrying damp hygroscopic cargoes. Nevertheless, in both cases the original condition of the hazardous cargo is, in many cases, the "conditio sine qua non."

● Coating and Wrapping Cargoes

The coating and packaging of goods has become a highly intricate industry and science, which has warranted the publishing of a number of good books and magazines.

One important purpose of coating and packaging goods for water shipment is the protection of the goods from corrosion. Therefore, all coatings and wrappings primarily prevent free moisture from getting in contact with the metal, which means they have to be impervious to moisture and very strong mechanically. Unfortunately the mechanical abuse to which cargoes and goods are subject before, during and after an ocean voyage are so severe that efficient but inexpensive materials are scarcely available. Even a strong wooden box is likely to be crushed or moisture may enter a package that is entirely covered with sheet metal. The same thing is true unfortunately as regards rust-proof coatings. Canned goods, wire, etc., may be galvanized, tinned, lacquered or oiled, but when moisture does get in contact with the goods, it is generally observed that rusting is reduced, but cannot in most cases be prevented.

● Covering Cargoes with Water-Repellent and Absorbent Materials

Large sums of money are spent by shipowners for paper, matting, etc., which are used for covering cargo. The purpose of this practice is either to absorb or to shed overhead condensation. The protective value of paper, tarpaulins and matting seems to be greatly overestimated. Shedding of water from the middle of the hold to the sides is bound to be uncertain, because of the irregular surface of the cargo and the motion of the ship.

The absorbing capacity of a thin paper coating can be calculated approximately by assuming that it can take up an additional 30 per cent by weight of hygroscopic and free moisture. This would probably amount to a few hundred pounds in the average cargo space, which would be satisfactory in cases of limited condensation, but could not hope to deal with heavy precipitation.

Furthermore, some authorities claim that the moisture absorbed by paper, matting and bags of sawdust is bound to be released again later, partly into the cargo space and much into the cargo itself, with corresponding exposure to damage.

It must not be forgotten, too, that impervious sheets and tarpaulins will restrict and can condense the evaporation of moisture from the cargo.

● Dunnage and Insulation

(1) Effect of Hot Bulkheads. Proximity to hot bulkheads, hot shaft alleys and steam piping may easily cause trouble with damp hygroscopic goods. We have seen that a rise in temperature materially increases the vapor pressure in hygroscopic products. This will cause moisture to diffuse toward the zone of lower vapor pressure away from the hot metal. The colder hygroscopic cargo near the hot zone will absorb the moisture, with the result that its moisture content will rise. At the same time, the originally cool cargo will get warm, partly due to the absorption of moisture and partly due to added heat from the hot metal. This heat will cause the moisture to be re-evaporated and diffuse to some more distant zone from the hot metal. As the whole parcel gets warm, moisture will leave the parcel and enter the contacting air.

Evidently the rate of heat transfer and the existing temperatures will determine the rate of moisture transfer through the mass of cargo. Little exact information is available on this highly interesting subject, but it is well known that the moisture movement, which is started by a hot bulkhead, may cause considerable damage in damp hygroscopic cargoes. When cargo first becomes heated, a sudden rush of moisture is caused, which may be likened to a wave. If the first impulse is great; for instance, when the bulkhead is very warm, or the cargo very cool, the moisture wave is substantial and much moisture may accumulate in the adjacent cool zone whence the wave continues and slowly eases off.

In hygroscopic cargoes, which are prone to heat spontaneously, the sudden accumulation of a great deal of moisture will necessarily start rapid respiration. The respiration generates new moisture and new heat, which enhances the above described effect of the hot bulkhead.

A vicious circle has begun. In damp bulk grain cargoes this process often takes the form of a wave of spontaneous heating through an entire cargo hold. It has been observed that such waves may pass through separating bulkheads into adjacent holds filled with similar cargo.

As stated before, it is not known exactly how the heat and moisture affect each other and proceed through a mass of cargo, but it is well known that a slow transfer of heat from the hot bulkhead does not induce such a dangerous wave of moisture. For this reason, the practice of dunnaging or insulating hot bulkheads, shaft alleys, etc., is undoubtedly a sound one. The insulation is customarily done by sheathing the hot metal with a solid wooden bulkhead and by leaving an air space between the wood and metal. It should be noted that such insulation will not prevent the transfer of heat; it merely slows it down. For example, it is well known that the attic under an insulated roof gets just as hot as the one under a normal roof without insulation. It merely takes longer to get hot. Calculations indicate that the rate of heat transfer from the air in the boiler room through a normal steel bulkhead to the air in the cargo hold is about four times faster than the transfer of heat through a sheathed bulkhead. Whether or not this reduced rate will prevent the formation of a moisture wave in the cargo depends largely on the dampness of the cargo.

(2) Effect of Cold Bulkheads and Cold Parts of the Cargo. A cold bulkhead will cause trouble with hygroscopic cargo and with metal cargo. In warm and damp hygroscopic cargoes a cold bulkhead, the side of the ship or an intake ventilator passing through the cargo will start a process opposite to the one just described. When the temperature of the cargo is reduced, its vapor pressure is also reduced and moisture will diffuse from the warm inside of the cargo to the cool zone. This moisture transfer leads to the accumulation of moisture near the cool metal with subsequent spontaneous heating. A vicious cycle, such as the "wave of moisture" described above, is not likely to get started under these conditions, due to the continued cooling effect of the sea water and ventilating air, resulting in continued attraction of moisture and very heavy local damage. The cooling effect of the cold ship's sides, etc., has been observed to promote damage as much as six feet away from the cool metal into warm and damp bulk cargoes. Near the cold metal the grain was actually wringing wet due to the condensation of moisture both on the cold metal of the ship and on the cool kernels of the cargo.

Canned goods and steel cargo which are stowed near a cold bulkhead or deck, especially adjacent to refrigerated spaces, are likely to be cool. This is no disadvantage, except when the hold is ventilated with humid air, or if the goods are unloaded in humid air, the dew point of which is higher than the temperature of the steel goods. Then condensation of moisture on the cold goods is likely to cause subsequent damage.

In view of the above the practice of stowing canned goods, steel and damp hygroscopic goods away from cold metal of the ship's structure is strongly recommended. The cold metal itself offers a convenient condensing surface for any damp air that may get in touch with it, therefore such metal surfaces are likely to be wet frequently and cargo should not be permitted to get in touch with wet metals. Much effort and money are spent in the construction and maintenance of spar ceilings against the frames of the holds, and deck beams, stanchions and ventilators are covered with paper, matting and dunnage wood for the carriage of sensitive goods.

Example: Condensation in Bulk Corn Cargo. A striking instance of internal condensation, but without the presence of cold metal, was seen in a ship loaded with Argentine corn. This ship was tied up on the Pacific Coast due to the maritime strike. Much of the grain that is shipped on this route is loaded in such a condition that it heats rather slowly. After about six weeks time it is so warm that it should be unloaded, cleaned and cooled, lest it become depreciated in value. If the corn is not unloaded for certain reasons, such as delays on route due to bad weather or strikes, the grain will accelerate heating and respiring with damaging results. The above mentioned ship could not be unloaded but was under inspection. It was decided that several of the hottest hatches should be cooled with dry ice. About two tons of "dry ice" (solid carbon dioxide) were distributed over the surface of each of these hot cargoes. The carbon dioxide gas, which evaporated from the numerous 50-pound blocks, was cool and heavy and sank into the mass of corn, where it displaced some of the trapped air. Both the respiration of grain and the metabolism of mold germs require oxygen and it is likely that the heating process was partially arrested.

The cooling action of the dry ice was noticed in the first few days and the temperature of the grain of the surface layer of several feet thickness was materially lowered. The amount of cooling that the dry ice can perform may be calculated from the following data: Specific heat of dried corn, 0.28 B.t.u. per pound per degree F.; latent heat of dry ice, 235 B.t.u. per pound; final temperature of carbon dioxide gas, 80 degrees; temperature of dry ice, –110 degrees; specific heat of gas, 0.21 B.t.u. per pound. This means that 2 tons of dry ice can absorb about 1,200,000 B.t.u. and this amount of heat is removed by cooling about 80 tons of corn 26 degrees. In a hold of 60 feet by 60 feet area this means a layer of about 1 foot in depth. The volume of gas developed by the dry ice is about 35,600 cubic feet.

These figures are approximate, but there can be no doubt that 2 tons of dry ice cannot but begin to cool down a cargo weighing 1500 tons, which is furthermore continuously developing new heat due to its respiration. What actually happened was observed after a few weeks. The cooling action of the dry ice was sufficient to chill only the surface of the grain cargo. The interior of the bulk remained between 90 degrees and 116 degrees as measured, meaning that the vapor pressure in the mass of grain was very much higher than in the

(Page 57, please)

New Union Oil Company

Tanker L. P. St. Clair

On arrival at her home ports of Los Angeles and San Francisco, the new tanker L. P. St. Clair of the Union Oil Company of California received a very enthusiastic welcome and attracted much favorable comment from the many visitors who inspected her in each port. Among these visitors were many marine experts. Those interested mainly in engineering were loud in their praises of the machinery layout and especially of the arrangement of steam piping. The naval architects, on the other hand, found much of interest in the Bethlehem-Frear tanker construction system of connected longitudinal framing and fluted plate bulkheads, of which this tanker is the first example on the Pacific Coast.

L. P. St. Clair was built by the Sparrows Point yard of the Shipbuilding Division of the Bethlehem Steel Company. Contract was signed March 14, 1938; keel laid April 19, 1938; hull launched December 10, 1938; trial held February 15, 1939; and vessel delivered February 28, 1939. She arrived at Los Angeles, her home port, March 24, and at San Francisco March 27.

The vessel with its equipment and propelling machinery was built under special survey and classification of the American Bureau of Shipping for carrying petroleum products in bulk with flash point below 150 deg. F. and all requirements of the General Rules and Regulations and the Load Line Regulations prescribed by the Bureau of Marine Inspection and Navigation at the time of signing of contract.

She is in strict conformity with and passed all the current regulations of the Panama Canal and Suez Canal authorities for bulk petroleum products carrying vessels and for transport and handling of all categories and grades of special hazardous and dangerous petroleum products, especially Grade "A" Panama Canal Classification of products.

This vessel is of the single screw American three-island-profile type, with straight raked stem and cruiser stern.

Her principal characteristics are:

Length, overall	463′-0″
Length, between perpendiculars	442′-0″
Breadth, molded	64′-0″
Gross tonnage	8,066 Tons
Net tonnage	4,814 Tons
Cargo capacity, 98% full	101,400 Bbls
Fuel capacity, 98% full	10,500 Bbls
Fresh water capacity	119 Tons
Speed, loaded, on trial	13 Knots
Cruising distance	20,000 Miles
Depth, molded to upper deck at side amidships	34′-10″
Designed loaded draft molded	28′-4″
Displacement, molded, at designed loaded draft	16,970 Tons
Deadweight at designed loaded draft	13,000 Tons
Normal crew	37

The new system of construction employed in this vessel is described as follows by a former pupil of its inventor, Hugo P. Frear, consulting naval architect for Bethlehem, and styled the "Dean of American Naval Architects":

"All longitudinals throughout the hull (excepting at bow and stern, where transverse framing is used), on bottom, sides, and deck, consist of bulb angles graduated in size in accordance with the load on them. These are cut at bulkheads and a round-bar connection is employed, being welded to the bulkhead plating and to the bulb part of each longitudinal. Hence, a practically continuous structure is obtained. Transverses are notched out around the longitudinals, and round-bars reinforcements are fitted at the points of support, and to provide a longitudinal member in which the stresses are approximately equal throughout its length. All transverses are equidistant from each other and from bulkheads, three transverses between each pair of transverse bulkheads. This feature makes for easy and rapid fabrication of structural parts, since a great many units are exactly alike.

"This type of framing possesses the very valuable attribute of being the lightest framing, for a given strength, yet found. Actual calculations for these vessels show a marked saving of weight with this system over conventional framing. In these days of competition saving of weight assumes a position of more importance than ever, since

weight saved means deadweight gained.

"The fluted plating method of bulkhead construction also economizes in weight and in ease of construction. This system employs a special fluted bulkhead plating, in which each plate is pressed by machine, in one operation, to a troughlike section the long way of the plate. This trough is three feet wide at the top, two feet wide at the bottom, and eight inches deep, and is made near one side of the plate, leaving the remainder flat. The fluting is uniform across the entire bulkhead, spaced at 5½ foot intervals, and the original plate width is adjusted to suit, so that each pressed plate forms one complete, finished unit ready to assemble. Plate joints are welded, with a two-inch overlap.

"This fluting of the bulkhead plating does away with the necessity for separate bulkhead stiffeners, since the plate itself, by its shape, provides local stiffness and requires a minimum of outside support. The only supports actually required for these fluted bulkheads are simple and easily built plate webs normal to the fluting, and approximating the webs which would be fitted in addition to stiffeners in the usual type of bulkhead construction.

"In transverse bulkheads, the fluting runs vertically, and three horizontal webs are fitted in the entire depth of the hold. For longitudinal bulkheads, the fluting runs fore and aft, and the three transverses between each pair of transverse bulkheads form the bulkhead supports.

"This system of bulkhead construction possesses several inherent advantages. In the first place, it is light, and thus results in additional paying deadweight for a given displacement. Secondly, it presents a smoother and greatly reduced surface for cleaning or subject to corrosion. Also, since the sides of the fluting all slope, it is, to the greatest possible extent, self-draining.

"This combination of framing and bulkhead construction, both of which are lighter than those of customary design, permits the use of heavier scantling than usual, with extra thickness of metal in those parts in which corrosion is most active, thereby minimizing repair expenses and prolonging the life of the vessel. However, since the greater part of the weight saving still remains for use to increase the dead weight carrying capacity, this vessel has an extremely high deadweight ratio."

● Propulsion Machinery

A set of Bethlehem cross compound double reduction geared turbines drive the single screw. These turbines were designed and built at the Fore River yard of the Shipbuilding Division of the Bethlehem Steel Company. The set is designed to deliver 3500 normal horsepower with the propeller shaft turning 85 r.p.m. under steam throttle conditions of 375 lbs. pressure, 725° F. temperature, and a vacuum at exhaust flange of 28¼ inch. Hg. Under these conditions the high pressure rotor (of the combined impulse and reaction type) turns 5500 r.p.m., and the low pressure rotor (of the single flow reaction type) turns 3500 r.p.m. The propeller is 18 feet 6 inches in diameter, of 15 feet 3 inches pitch, and is designed to drive the fully loaded hull at 13 knots when turning 85 r.p.m.

An astern turbine with sufficient capacity for good maneuvering ability is fitted in the low pressure ahead turbine casing.

Corner of a sailor's bedroom on the L. P. St. Clair.

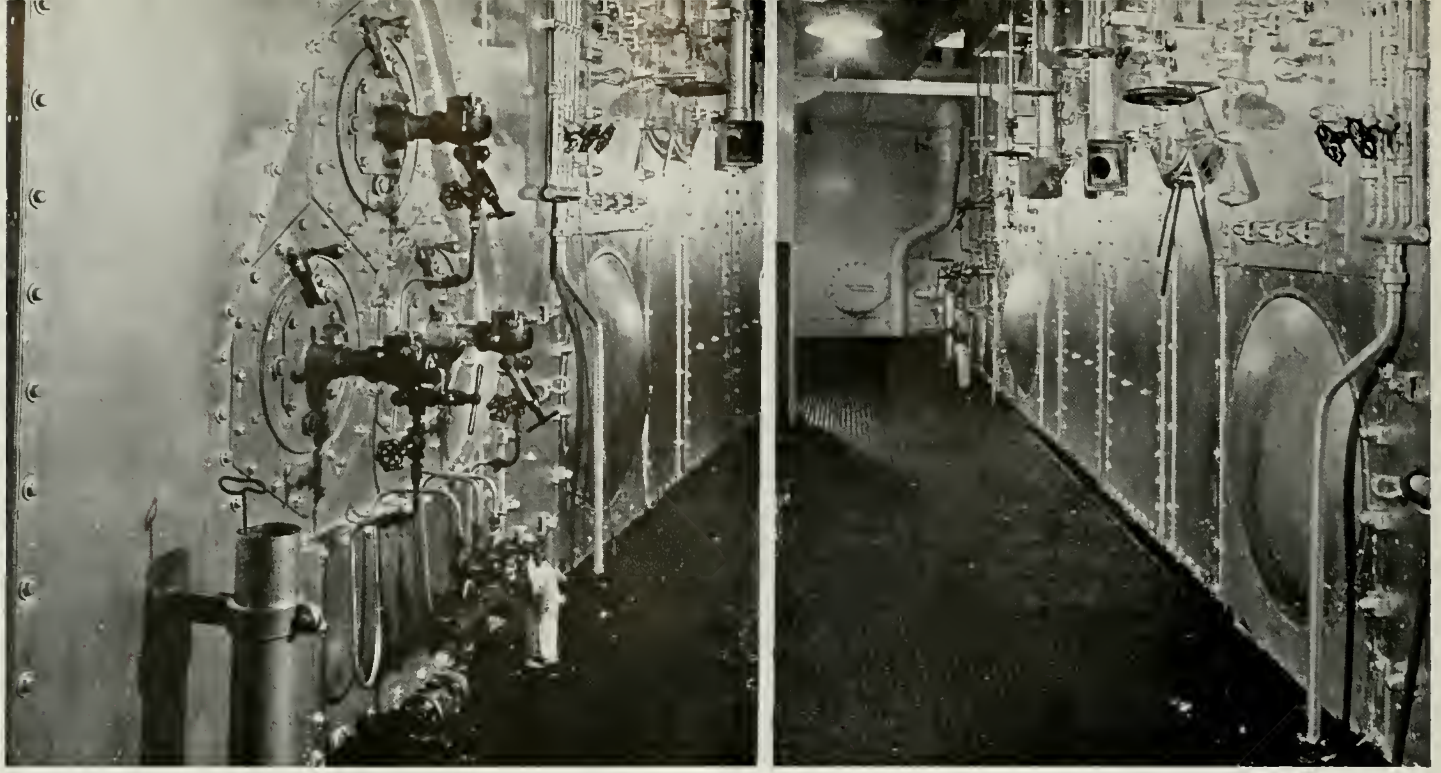
The low pressure turbine exhausts directly into the main condenser, which, together with the auxiliary condenser, is also of Bethlehem design and construction.

Under normal sea operation the main condenser handles all exhaust steam, the auxiliary exhaust being admitted through an automatic exhaust back pressure valve. The auxiliary condenser is normally used only in port, and handles the steam from the turbo generating sets and from auxiliaries.

The reduction gears are of Falk manufacture, and the gear case houses also the Kingsbury thrust bearing for the propeller shaft and a reversible motor drive turning gear.

The lubricating oil system is of the gravity type served by one Northern rotary motor driven oil pump drawing oil from the sump and discharging into the oil supply line (which is kept under constant pressure by a gravity tank) through an oil cooler. The tanks and coolers are installed in duplicate, one being a standby. A Worthington vertical simplex pump steam driven is installed as a standby service pump. A De Laval Uni-Matic purifier with a separate steam heater and with a capacity of 150 gallons an hour keeps the lubricating oil in good condition by either continuous or batch operation.

Steam is supplied by two Foster Wheeler "D"-Type water tube boilers, each with a heating surface of 4928 square feet and each having an evaporating capacity to produce



Two views of the Foster Wheeler boiler furnace fronts.

24,500 pounds per hour of steam at 400 pounds pressure and 750 deg. F. total temperature. These steam generators have built-in economizers, superheaters and desuperheaters.

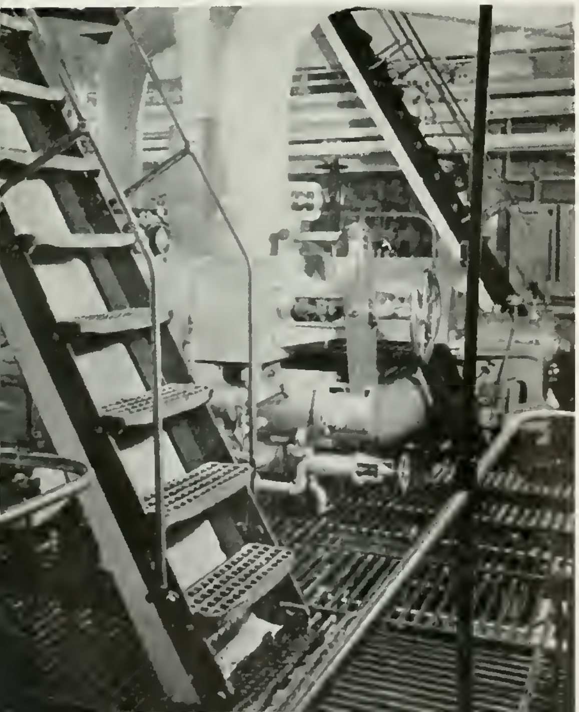
Each boiler is equipped with eight soot blowers of the full automatic valve in the head type supplied by the Vulcan Soot Blower Corporation. Steam pressure of each blower may be regulated according to the cleaning requirements through an exterior adjustment on the head of the blower.

A Wager Smoke Indicator is fitted to each boiler. These indicators are of the periscope type and are so arranged that smoke conditions in both uptakes can be observed from one position in the fire room.

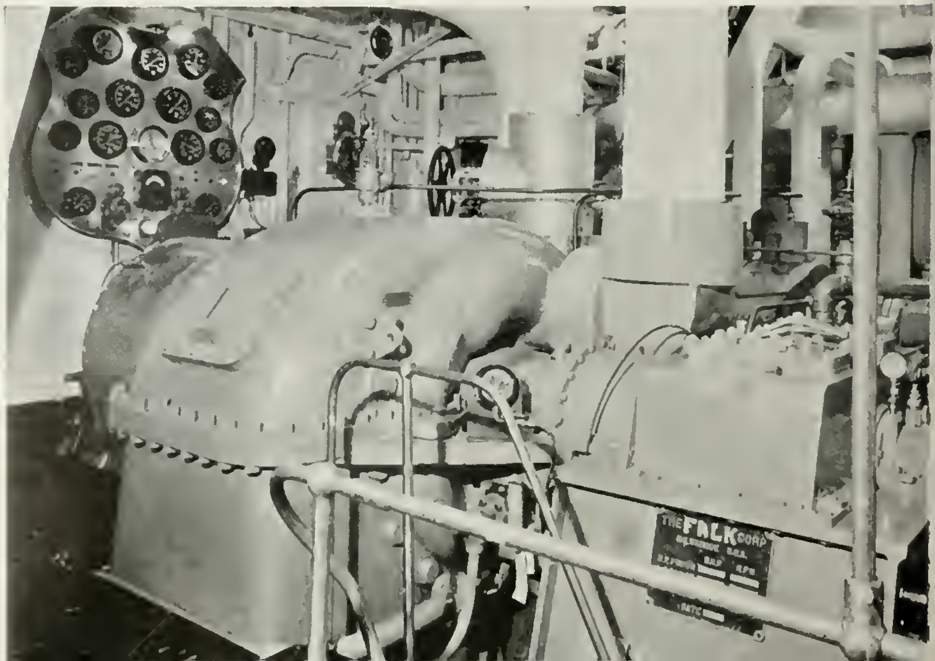
The boilers are mounted on a flat above and aft of the turbines. The arrangement is fore and aft with the drums athwartship and the firing fronts on the starboard side. Three Todd Hex-Press model forced draft double casing type air registers and oil burners fire the furnace in each boiler.

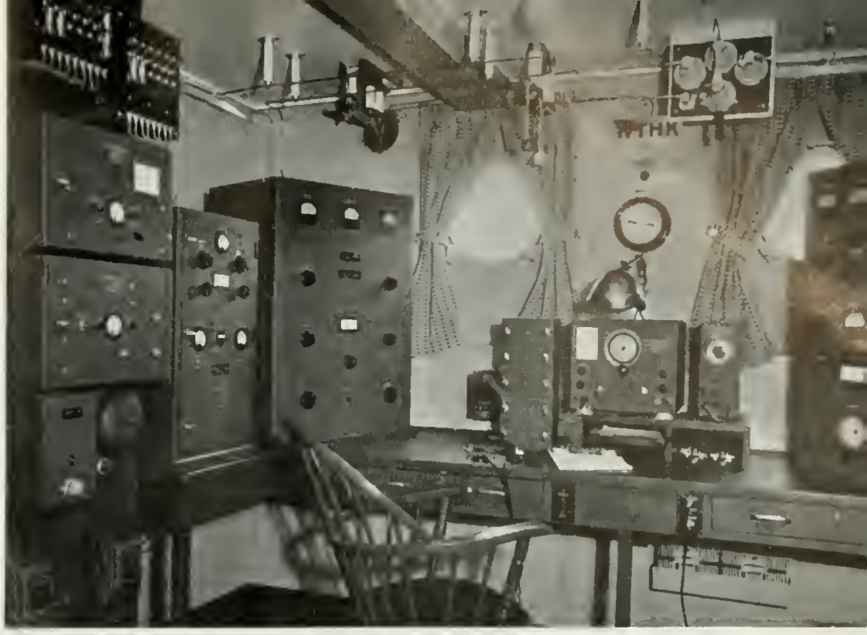
Combustion in these furnaces is supervised by the Hagan Automatic Combustion Control, which has received widespread approval from both designers and operators in the marine field. Being fully automatic, of rugged design, without any parts subjected to excessive wear, the control maintains constant steam pressure and correct fuel-air ratio, thereby maintaining proper combustion at all times. This proper combustion eliminates smoke and reduces soot and furnace maintenance.

During the builders' trials the conditioning of boiler water was under the supervision of a Bull & Roberts service engineer, using the Hall System of Boiler Water Conditioning. The vessel's engineers having been instructed in the proper way to handle boiler water, they are able to maintain efficient operation by preventing the development of scale and corrosion.



Two views of the Bethlehem main propulsion turbine.





The L. P. St. Clair keeps in touch with the world through this modern Mackay Radio equipment.

Two Northern rotary motor drive fuel oil service pumps and two fuel oil heaters serve the boiler furnaces, one of each having capacity to take care of full requirements for both boilers. A Worthington horizontal duplex steam pump acts as standby.

● Steam Driven Auxiliaries

The two main feed pumps are Worthington centrifugals directly coupled to Sturtevant turbines, and one Worthington reciprocating steam drive standby feed pump is installed for emergencies. Each main pump will deliver water enough for simultaneous overload operation of both boilers.

The cargo pumps are Kinney Heliquads driven by Whitton steam turbines. There are four of these pumps, three main and one stripper. Each main pump has a capacity of 3000 barrels per hour, and the striper pumps 500 barrels per hour. A very flexible piping arrangement designed by the technical staff of the Union Oil Company enables these pumps to handle three different oil products simultaneously without mixing. The pump room is ventilated by an American Blower fan driven by a Coppus steam turbine.

Two Westinghouse 240 volt D. C. steam turbo reduction geared generating sets supply electric power for the ship which is distributed through a Westinghouse switchboard. 120 volt current for lighting circuits is supplied by two General Electric motor generators.

The American Engineering Company supplied steam deck auxiliaries, including four capstans, two cargo winches, two large warping winches, one windlass, and the steering gear.

● General Service Auxiliaries

Worthington supplied all general pumping equipment, including one centrifugal fire pump driven by a Superior diesel engine, one centrifugal motor-driven general service and ballast pump, and one motor-driven centrifugal sanitary pump, two motor-driven plunger units for potable water and wash water hydro-pneumatic service, one horizontal duplex steam-driven general service and ballast pump, and horizontal duplex steam-driven evaporator feed pump, and a vertical duplex steam-driven fire, bilge and ballast pump.

A Davis Engineering Company 15-ton capacity evaporator and a distiller of the same make and capacity will be fitted in the engine room and arranged for making potable water from sea water and for pre-evaporation of raw feed water. Davis Engineering Company supplied also the fuel oil and lube oil heaters and the lube oil coolers.

Compressed air for automatic controls, air operated tools, and other miscellaneous services is supplied from an air receiver charged by a Worthington motor-driven compressor with a standby connection from a Westinghouse steam-driven compressor.

Refrigeration spaces for food storage are cooled by a Carrier Brunswick direct expansion ammonia plant. This plant is designed to maintain suitable storage temperatures in the ship's stores, refrigerators, and to cool drinking water for crew.

Paint is an important item in the maintenance program of a tanker. On the L. P. St. Clair the painting of the interior living quarters has been harmoniously carried out in "Dulux," supplied by du Pont. The walls of dining room and officers' quarters are in French gray with a trim of sandstone color. The ceilings are in flat white, producing a maximum of light diffusion with minimum glare.

The superstructure exterior is in "Dulux" Spar Gray. The hull above the waterline is in black with a five-foot band of "Dulux" Spar Gray encircling the boat just below the deck.

● Safety Features

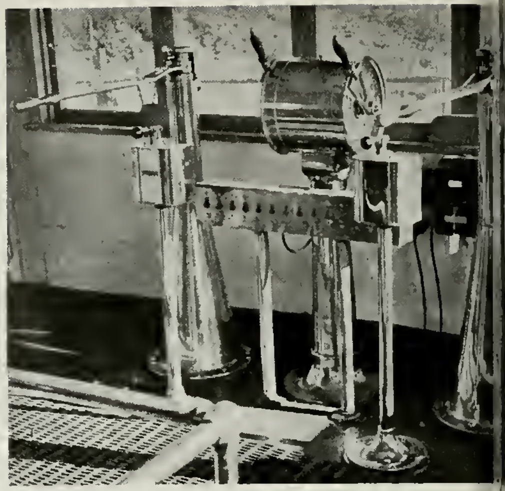
Safety is of paramount importance when handling petroleum and its distillates, and the tanker L. P. St. Clair is equipped with proved devices for insuring safety.

In order to maintain a predetermined vacuum and pressure in the vapor space above the cargo in the various compartments of their ship, the Union Oil Company has installed in the vent piping of each compartment a 4-inch flanged all-brass Shand & Jurs Vacuum and Pressure Cargo Breather Valve. The use of this valve constitutes a considerable safety factor in that the fitting, being of all-bronze construction, is entirely spark proof and it is completely vapor tight. It also embodies a non-sticking material which is used in the form of a ring to contact the valve seats, insuring vapor tightness at all times. Adjustment for varying load requirements is provided, as well as means for locking the pressure pallet in an open position. This feature is particularly important when a flue gas system is used.

The engine and boiler room spaces are protected against fire by the Lux carbon dioxide system. Twenty-six 50-pound capacity Lux cylinders are conveniently stowed in the steering gear space. The controls for operation are in the crew passage convenient to an exit from the spaces protected.

(Page 58, please)

An Interesting All Welded Steel Hull Shallow Draft River Towboat



Pilot house, featuring engine, steering, sea and telephone controls.

Late in 1937 the Socony Vacuum Oil Company established an oil distribution service on the Mississippi, Missouri and Ohio Rivers, with a new diesel driven, tunnel stern, twin screw towboat and barges especially designed for this service. So successful was this service that a need for additional equipment became apparent almost immediately. Based on experience with the original towboat, a new hull and superstructure was designed and is now in operation under the name St. Louis Socony.

The hull of this vessel is 137 feet long and has a beam of 35 feet, a depth of seven feet and a draft of 4 feet 6 inches. It is of welded transverse framing construction with longitudinal bulkheads in way of the deck house to give depth of girder. Additional longitudinal trusses are fitted in the way of engine beds. The accommodations in the deck house are arranged to permit the centerline bulkhead being carried up through the deck house to assist in girder strength. In way of engine room the centerline bulkhead is omitted. All hull space below main deck, except in the engine room, is reserved for buoyancy compartments and for various tanks.

Propulsion machinery consists of two Busch-Sulzer 4 cycle mechanical injection diesel engines. Each of these engines has eight cylinders of 13 inch bore and 20 inch stroke, and has a rated capacity of 600 B.H.P. at 300 r.p.m. and 75 pounds mean effective pressure. Built in auxiliaries on each of the engines include: a cooling water circulating pump; a fuel oil transfer pump; a lubricating oil pump; and a cooling water heat exchanger. The last named is installed because the fresh water in which this towboat operates is often so charged with silt that it would be very detrimental to use it for direct cooling in the engine cylinders.

A quartering bow view of St. Louis Socony plowing up the river.

The closed fresh water cooling system consists of a Sims heat exchanger built into each engine and each of sufficient capacity to handle the cooling water necessary for a maximum engine output of 700 B.H.P. when the raw water from the river is at 90° F. These heat exchangers are connected so that either one or both can serve either one or both main engines and either one or both auxiliary engines. The engine cooling water is drawn by the pump from the storage tank, driven through the engine jackets, and thence through the heat exchangers and back to the storage tank. The raw cooling water for the heat exchangers is handled by a Gardner-Denver centrifugal pump of 400 gallons per minute capacity.

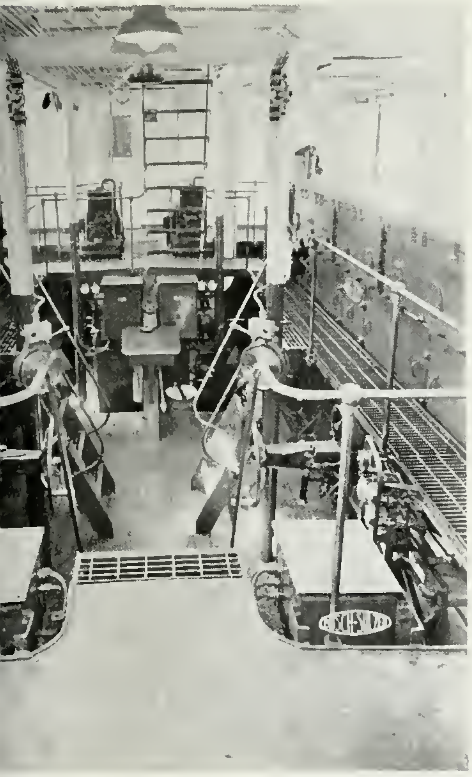
Each main engine is directly connected to its propeller shaft through a Kingsbury thrust bearing and drives a Ferguson prepeller of Socony Vacuum design having 71 inch diameter and 49½ pitch.

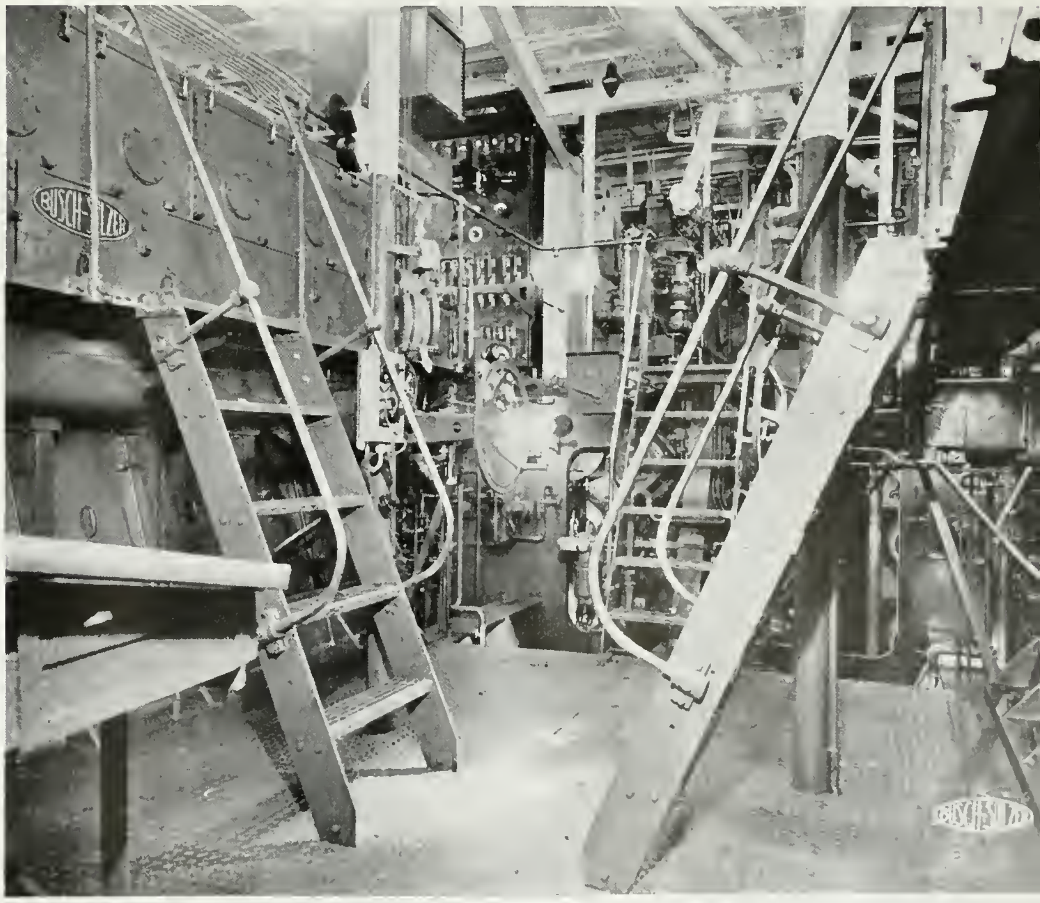
As will be noted in our illustration, the control panel and throttle wheel for each main engine is located on the inboard side of the housing and the two controls may be operated simultaneously by one engineer. Starting air is stored in 10 tanks 24 inches in diameter and 96 inches long. These are kept at 250 lbs. pressure by two Ingersoll-Rand compressors.

A pair of 200 gallon tanks in the shaft alley store lubricating oil; and two 60 gallon service tanks, one located above each engine, feed the oil to the lube oil pumps on the engines through two Nugent filters.

Two 40 KW Century generators each driven by a Superior diesel engine rated 63 H.P. at 900 r.p.m. provide power for lights and auxiliary machinery. An Edison 150 ampere hour storage battery picks up emergency circuits in case of any current failure. This battery also supplies lights and small motor current when the towboat is tied up.

The crew accommodations on St. Louis Socony set a new level of luxury for river towboats, as shown here in the officers' lounge with its lustrous finish and its moderne metal furnishings and lighting fixtures.





Two Busch-Sulzer 8 cylinder 600 B.H.P. diesel engines drive the two propellers of the St. Louis Socony. Above: Looking aft from the upper platform, featuring, on upper level in background, the two steering engines and two Nugent filters. At right: The working platform, looking aft. Note on upper level one of the generating sets and part of the switchboard.

STEAM JET AIR EJECTORS

Air removal apparatus, being so important and bearing such a direct relation to the operation of an engine or prime mover, has been the source of much study through recent years. Engineers have periodically improved the apparatus and equipment used for air removal in conjunction with steam condensers, always aiming at:

Lower first cost.

Reduction of moving parts.

Smallness in size and lightness of weight.

Economy of operation.

It is but natural that the larger the unit operated the greater the opportunities for saving, by the application of the most efficient air removal equipment available.

The Prime Movers Committee of the National Electric Light Association composed of outstanding engineers in the public utility field, have continually, through their studies and in cooperation with the various manufacturers, assisted in the development of air removal apparatus and improved it to its present state.

To realize the losses that exist when the lack of facilities for the attainment of high vacuum exists, you have but to take a rough rule of thumb formula. This rough formula is that one-tenth of an inch of vacuum is equal to one-tenth pound of steam per KW hour.

Assume, in a public utility, a generator of 60,000 KW, and assume that the vacuum is ½ inch lower than obtainable by the best apparatus; this would be equivalent to .5 inch of vacuum or ½ pound of steam per KW hour. As the unit assumed would be 60,000 KW, it can be seen that 30,000 additional pounds of steam per hour would be required to obtain the same KW output.

In the marine field the units are naturally much smaller but the savings are directly in proportion.

A report by the Prime Movers Committee of the National Electric Light Association, some years ago, showed the following comparative cost of maintenance for three types of air pumps in general use.

Type	Maintenance Cost Per 100 Hours' Service
Reciprocating dry pump	$12.50
Hydraulic	$45.20
Steam Jet Air Ejectors	$6.40

These relative costs do not take into account the additional important factors of inconvenience, due to lost time during repair and low vacuum obtained during period immediately preceding repair of the reciprocating dry pump or hydraulic pump.

With a steam driven mechanical air pump, normally used aboard ship, or the wet and dry type pump, steam jet air ejectors show even a greater advantage than in the comparisons shown above. It is a good approximation to say that the steam jet air ejector will consume approximately 30 per cent of the steam that would be used to operate a steam driven mechanical air pump or the ordinary wet and dry pump used aboard ship or the direct connected pumps frequently used with reciprocating engines.

Many companies today are making all studies possible to reduce maintenance and operating costs on vessels, and yet there are only a small number of companies—on the older type vessels—who have taken advantage of fitting steam jet air ejectors in place of the old type and ordinarily used pump. It is safe to say that the average ship, between 2000 and 4000 H. P. would save 400 to 800 pounds of steam per hour by merely substituting the steam jet air ejectors for the older type pump.

The steam jet air ejector occupies a space that is probably one quarter of that required for the old type pump.

While the steam required to operate a steam jet air ejector is so much less than that of the commonly used pump, all of the heat of the steam used is reclaimed, with the exception of heat of radiation.

Repairs to the condensate and air removal equipment, are excessive and normally cannot be undertaken by the ship's crew, the maintenance is extremely high, as previously referred to in the report by the National Electric Light Association.

The steam jet air ejector is normally furnished in twin elements, which means that, at a very small additional cost over a single element, you have two units, one in operation and one a stand-by. There is practically nothing to get out of order in a steam jet air ejector and its maintenance cost is decidedly low and economical.

Another great value of the steam jet air ejector is the fact that it will and does maintain a higher and also a more uniform vacuum.

In the case of reciprocating engine operation, it is unquestionably true that some particular vacuum is the most economical vacuum on which the particular engine will operate most economically. In checking up a good many reciprocating jobs, for determining this best vacuum condition, it has been found that with the old type condensate and air removal equipment, it is difficult to maintain a constant uniform vacuum, regardless of the temperature of the sea water. With the steam jet air ejectors the best vacuum can be determined for each vessel and this best vacuum can be maintained 24 hours a day 7 days a week in operation, with the sea water temperature up to as high as 90 degrees.

The enormous difference in the cost of operation of the steam jet air ejectors, from the standpoint of:

First cost

Space required

Low maintenance cost

High, reliable and uniform vacuum results

In the case of a beam connected air and condensate pump, the disconnecting of the beam from the LP engine, and the direct operation of the steam jet air ejectors, will show a proportionate increased H. P. or r. p. m. in the main engine, with the same steam consumption.

It is understood that there is a firm installing steam jet air ejectors on the basis that they furnish and install the ejectors and are paid on the basis of fuel savings after the fuel savings are actually made.

New R.P.M. DELO

A Diesel Lubricant of Higher Standards

After 10,000,000 test miles—over 400 times the distance around the world—after 90,000 test hours—equal to 10 continuous years of testing—Standard Oil Company of California is announcing its New "RPM" DELO (diesel engine lubricating oil).

Standard Oil engineers are confident that this New "RPM" diesel engine lubricating oil will bring the maximum service benefits of correct lubrication to all diesel engines, regardless of size or design. These scientists stress the point that now giant diesels in power and industrial plants, small high-speed diesels in trucks and buses, rugged diesels in tractors and aboard ships—every one—can derive full lubrication protection from its proper S.A.E. grade of New "RPM" DELO.

To meet all requirements of all diesels, New "RPM" DELO possesses the following important properties as established by exhaustive field and laboratory research:

1. It prevents ring-sticking even under the most severe engine operating conditions. In comparison with other oils it is appreciably superior in the maintenance of piston cleanliness and the prevention of carbon and sludge deposits in oil ring slots.

2. It is non-corrosive to alloy bearings and is, therefore, suitable for use in all engines, regardless of bearing materials. New "RPM" DELO is highly recommended for engines employing copper-lead, cadmium-silver, Satco and similar types of bearing materials.

3. It reduces wear of cylinders, pistons and rings.

4. The compounding material used in new "RPM" DELO is a powerful anti-oxidant. Thus this lubricant is highly resistant to oxidation and deterioration.

5. In addition New "RPM" DELO's compounding is stable in the presence of moisture and in storage.

6. Due to its great stability, New "RPM" DELO will reduce filter clogging to the very minimum.

7. This lubricant minimizes cylinder and ring wear in high temperature regions such as the tops of pistons. This is because of New "RPM" DELO's unusual capacity to spread and lubricate hot metal surfaces instead of receding and leaving them dry. This vital property may well be described as "high engine film strength."

8. New "RPM" DELO protects all bearing surfaces, piston rings and cylinders during the critical breaking-in period.

The development of New "RPM" DELO with all these qualities to assure clean-engine operation and long peak-power performance is a "Marco Polo" adventure in lubrication engineering.

● Resistance to Oxidation and Moisture in Operation and Storage

The stability of a lubricating oil—its resistance to oxidation or change in chemical and physical properties—is extremely important. This stability determines the useful life of the oil. It establishes whether or not the lubricant may be expected to maintain its original service value over reasonable periods of time under actual operating conditions.

Resistance to oxidation is best measured in laboratory machines. The Oxidation Test, to which New "RPM" DELO was subjected, consists of air-blowing oil samples for 72 hours at 300° F. in the presence of cadmium-silver and copper-lead strips which act as catalysts and increase the severity of the test.

The newly developed compound used in New "RPM" DELO is a powerful anti-oxidant. Therefore, this lubricant resists oxidation or breakdown in operation to a remarkable degree. In Oxidation Test runs other test oils were greatly darkened as a result of oxidation. New "RPM" DELO, on the other hand, remained almost as clear after test as before.

In addition to its stability under severe test conditions and in actual operation, New "RPM" DELO also remains stable in the presence of moisture and when it is in storage. Its compounding material does not precipitate when subjected to thorough tests.

In storage New "RPM" DELO has been exposed to sunlight for periods of two months at a time and has been placed in a cold room at 32° F. for a similar period. Under neither condition does its compounding material show any tendency to precipitate.

● Brings Correct Lubrication To All Diesels

While their research has been based principally on high speed diesel engines of moderate horsepower, Standard Oil engineers point out that their field work on New "RPM" DELO also has included extensive investigation of the use of this product in many other types of diesels, including slow and medium speed installations of a wide range of power output. As a result of its performance in unprecedented laboratory and field testing, New "RPM" DELO (in proper S.A.E. grades) appears capable of lubricating all sizes and types of diesel engines correctly. However, improved lubrication resulting from its use generally will be noted sooner in smaller, high-speed diesels.

All this points to successful diesel operation at higher loads and with greater economy in maintenance, lubricating oil and fuel.

New Laboratories BENEFIT MARINE INDUSTRIES

By William H. Lowe, President, The Paraffine Companies Inc.

Few industries provide as severe tests for construction and maintenance materials as the marine field. Outboard-powered skiffs and proud liners alike subject paints, floor-coverings, wood and metal to an unmerciful buffeting and beating, in which wind, weather, sun, the sea, and plant and animal growths all play a part.

Not only do these factors attack all sorts of substances, but vessels that ply the sea lanes also encounter a tortional twisting and strain which force together, pull apart and rub against each other the various materials of which ships are made.

We of The Paraffine Companies long have recognized that specialized products are needed to meet the unusual conditions under which marine craft must operate. Early in the history of the organization, our chemists developed bituminous paints highly pigmented with red iron oxide designed to resist the action of the elements and the sea. Next came production of the so-called "metal" series of paints, also able to withstand salt water and sun, and which discouraged marine organisms from attaching themselves to ships' sides and bottoms.

Following the World War, an exterior lacquer was manufactured capable of resisting the combined attack of salt water and air encountered about vessels and docks. To this soon were added special enamels and varnishes, for finishing decks, cabins and other above-sea-level parts of freighters and passenger craft.

Pabco chemists have paid particular attention to development of anti-fouling and anti-corrosive paints. Their problem here has been twofold: to prepare finishes at reasonable cost, and to include in these products as much anti-fouling material as physical considerations will permit. Long-time experiments have been conducted to determine the efficacy of tellurium, lead, zinc, arsenic, mercury, copper and other metallic elements. Formulas have been discovered which, without interfering with spreading capacity, when dry leave a film appreciably thicker than that obtained with ordinary paints.

William H. Lowe

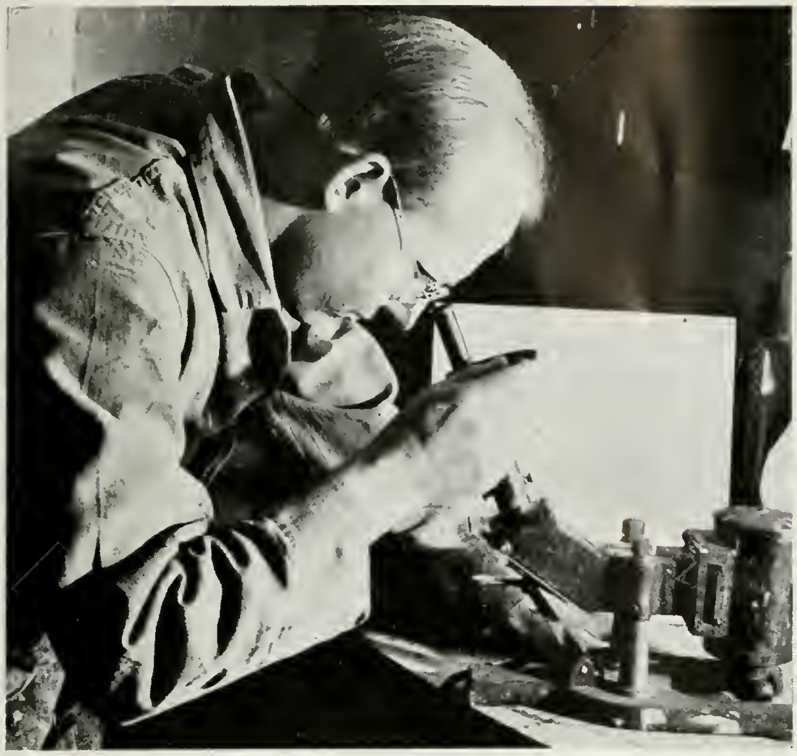
However, conditions under which ships operate vary greatly from port to port. Vessels plying between the cities of Puget Sound, in Washington, are attacked by growths considerably different from those encountered in San Francisco Bay, or the Columbia River, or Los Angeles Harbor. Likewise, finishes which protect against marine growths in one area do not prove fully effective in another, in many cases. Still further, finishes suitable for one type of ship sometimes cannot be applied successfully to other kinds of vessels.

For years The Paraffine Companies, Inc., has recognized its responsibility in assisting customers to find those products which most completely meet their needs. Many of the Pabco items of today were originated by its research men to meet the special demand of a single industry. The marine field has presented and continues to present unusual problems which require individual attention.

To assist ship and wharf owners of the Pacific Coast to secure the best possible maintenance materials, The Paraffine Companies, Inc., has announced an expansion of its organization to include a new Industrial Research Laboratories Division. The function of the new division will be to undertake research projects on behalf of Pabco customers and friends in all fields of industry.

Direction and coordination of the research work will be centered in San Francisco, at the main offices. Here an elaborate system is being set up to keep the salesmen informed of the division's work, and especially concerning the new products it develops.

The laboratories have been set up in Pabco's big plant at Emeryville, California. Here the division has elaborate facilities and staff of its own. The division also is able to call upon the services of the 40 research and control chemists now employed in the regular operations of the factory. This is expected to prove a highly valuable asset, as our technical staff includes men with experience and training in many lines of industrial endeavor. Also, because of their proximity to the production department, the laboratories can learn at once whether or not the results of their studies can be turned to commercial use.



Measuring reflected light from Pabco linoleum with an Ingersoll Glarimeter.

Soxhlet extractor equipment checks important properties of Pabco linoleum.

The company's services to the marine field will be divided into five districts, to coincide with its sales areas. Each of these district research plants will be under direction of a trained chemical engineer, who will have the title of technical advisor.

When a Pabco salesman encounters a towing company whose tugs are difficult to keep properly painted, or whose decks are wearing unduly, because of the conditions under which such vessels work, he calls in the technical advisor of his region. The latter secures all necessary data on the specialized requirements of the desired new product.

He then prepares a full account of the problem and submits it to San Francisco. The report is referred to the Emeryville laboratories, as a new project for the Industrial Research division.

Service to the marine industries is expected to be directed along a number of general lines. The problem of preventing sea growths from becoming attached to ships' hulls, and their destruction when this takes place, will receive a great deal of attention.

Equally numerous, we believe, will be the requests for studies of the corrosive and solvent actions of the sea and the elements. Special work will be done on protecting ships' holds from damage occurring during loading and unloading of cargoes. Still other projects will be concerned with the difficulties encountered in engine and boiler rooms, with protection of rope and cable, with development of special materials for surfacing decks, and with the thousands of other problems encountered by shipping in its visits to all corners of the world.

A program of research is behind the protective paint of the beautiful Grace Line steamers.

Steam Generating Equipment

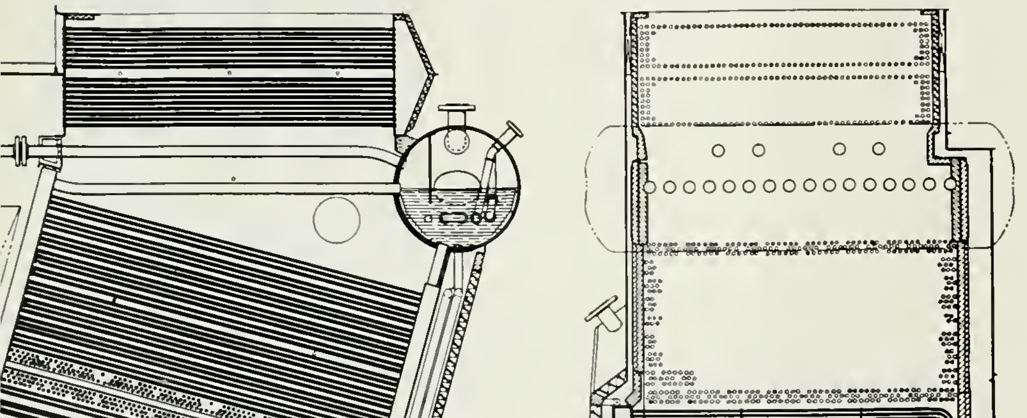
On High Speed Tanker Cimarron

The S.S. Cimarron is the first of twelve high speed National-Defense-Features tankers constructed by American shipyards under an agreement between the Standard Oil Company of New Jersey and the United States Maritime Commission. She was built by the Sun Shipbuilding and Dry Dock Company and immediately on delivery was taken over by the Government as a United States Navy tanker.

Her steam-generating equipment consists of four Babcock & Wilcox single-pass sectional-header boilers, equipped with steam superheaters, desuperheaters, air preheaters, and water-cooled furnaces. They are designed to operate with a steam pressure of 450 lbs. per square inch and a total steam temperature of 750 deg. F. at the superheater outlet.

Each boiler is 16 sections wide, and each section is made up of staggered groups of nine 1¼ in. tubes, closely spaced, with one group of four 2 in. tubes directly over the furnace; and arrangement providing a heat-straining device that assures high heat-transfer from the gases to the water within the tubes. With straight tubes expanded into headers, located at each end of the boiler, and, therefore, accessible from outside the boiler, the internal heating surfaces can be readily inspected and cleaned. In the event of a tube failure, the defective tube can be plugged or renewed without the necessity of waiting for the boiler to cool down sufficiently to permit entrance to the drums, a requirement with non-header boilers.

The interdeck-type superheater tubes extend the full width of the boiler, transverse to the boiler tubes, and have their headers located on the side of the boiler and within the double casing. This arrangement permits of ready access to the internal surfaces. Ample boiler heating surface between the superheater and furnace protects the superheater from direct flame impingement and from the radiant heat of the furnace.



Transverse and longitudinal sections of Babcock & Wilcox single pass sectional header marine type water tube boiler as installed on S.S. Cimarron.

The steam desuperheaters are of the internal-drum submerged type.

Each air heater, of the tubular type, has two air passes and one gas pass. Its use not only increases the boiler efficiency by deliverying preheated air to the furnace, but also improves the combustion of the fuel. In addition, the overall plant efficiency is increased with the use of 300 def. F. feedwater, obtained by bleeding steam from the turbine after it has done some work and utilizing some of the heat that would otherwise have been lost in the condenser .and discharged overboard Also the fact that the heat recovery equipment is not a pressure part reduces the overall maintenance cost by eliminating costly replacement parts.

The furnace sidewalls are water-cooled, each wall consisting of a vertical row of inclined tubes expanded into headers at its front and rear. These tubes are of B&W stud-tube construction, in which studs welded closely to the face of the tubes on the furnace side hold securely a covering of chrome plastic refractory around and between the tubes.

By the use of water-cooling, the furnace maintenance will be reduced and the chrome refractory covering on the tubes will resist slagging that would be encountered with ordinary refractory. Furthermore, the refractory covering on the tubes retains sufficiently high furnace temperatures to sustain combustion.

Each boiler is completely double-cased and arranged for forced draft. The air for combustion enters the air heater at the back of the boiler, makes two passes through the air heater, and then is directed through a duct, passing down the back of the boiler and then under it to the double front surrounding the oil burners.

Part of the air by-passes the air heater and enters the double casing covering the sides and front of the boiler. After passing over the inner casing of the boiler, the air enters the double front. This construction reduces the heat losses from radiation to a minimum and maintains a cool fireroom.

The gases of combustion, after leaving the furnace, make a single pass across the boiler and air heater heating surfaces. There are no baffles in the path of the gases from the furnace to the uptake. This design eliminates all soot pockets in the boilers and air heaters and results in a construction that is easy to clean and easy to keep free of soot. Mechanical soot blowers are provided for this purpose.

During the recent trials of this equipment, under designed operating conditions, the boilers averaged over 89 per cent in efficiency.

CARE OF CARGO

(Continued from page 45)

very cold surface layer. As a result, a great amount of moisture began to diffuse toward the cold surface, where it promptly condensed on the cold kernels. This surface layer was so cold that practically no moisture could escape from the hot cargo.

When the grain was finally unloaded, the following situation was discovered: The surface layer of the grain was dripping wet and it was estimated that as much as 10 tons of water was collected there. This layer was entirely spoiled by germination, molding, discoloration, etc., and had to be destroyed. The cooling effect of the dry ice vanished rapidly below this surface layer, but the entire mass of grain was hot and moist and was materially depreciated.

From all evidence it seems that, if carbon dioxide were to be used, it should have been applied in the form of warm gas but not as dry ice. The gas should have been injected near the bottom of the cargo, so that it could have displaced the air contained in the grain. The surface layer of the grain should have been ventilated with dry air, or relatively dry air, which would quickly remove any moisture that might come from the inside.

An experiment similar to the one just suggested was made in another Pacific Coast port at the same time. A powerful portable fan was placed in the open cargo hold and the surface of the grain was ventilated lively during the entire strike period of several months. It is reported that this particular corn cargo finally turned out unexpectedly well.

During the early part of the first case the question came up whether or not the damp and warm corn cargoes should be dried. This would have been the logical way of preventing spoilage and a simple system for doing so was worked out. However, the Argentine cargo owner declined because the drying of the grain would mean a loss of weight in the grain. Naturally, the heavy damage which actually occurred later on was not anticipated. But our investigation has shown that grain shippers do not seem to realize that a small loss in weight will often mean a good quality of cargo, and inversely a saving in weight may mean a substantial depreciation of the cargo.

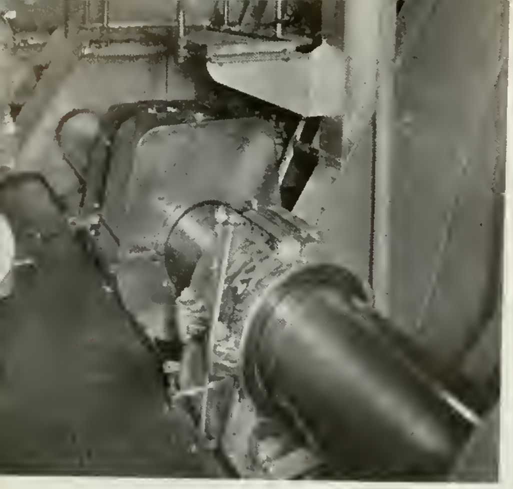
This opportunity is taken to point to the custom that grain and many other hygroscopic goods are sold by weight "as is," instead of on a dry-weight basis, similar to the trade in ore. This practice is leading to endless arguments between merchants and shipowners because grain and all other hygroscopic products change their moisture content with the condition of the atmosphere.

In view of the harmful effect of the hot and cold metal of the ship on cargoes, it has been suggested that such metal be permanently insulated. The sheathing of hot bulkheads, shaft alleys and steam pipes with wood has become an established practice not only with bulk grain but also with many kinds of bagged and baled cargoes such as tobacco, seeds, flour, etc.

This is the reason why some steamship companies have the weather deck sheathed with wooden planks. Recently the suggestion was made that the underside of the weather deck and the sides of the hold should be covered with cork paint or the like. Others consider the entire insulation of the cargo holds the only solution.

Considering the different phenomena which have been discussed and which will be discussed later in this paper, the following statements are advanced: An efficient insulation such as is used in refrigerated cargo spaces today is prohibitive for general cargo spaces because of cost, weight and maintenance. An efficient insulation of the weather deck and the ship's sides would undoubtedly prevent a great deal of condensation there. The mechanical abuse of any such feature is bound to be much greater in a cargo space, in which heavy machinery, semi-finished steel and other cumbersome cargo is carried. A less efficient insulation, such as wooden sheathing or cork paint, does not entirely prevent condensation. Wooden sheathing creates excellent harborage for rats, insects and other vermin; it is bound to rot very quickly due to its contact with the wet metal during long periods, and this will also promote serious corrosion of the steel hull. Aside from the reduction of overhead deck and side condensation and the reduction of moisture transfer in damp hygroscopic cargoes, the actual value of such an insulation is limited. The insulation of cargo spaces cannot prevent the condensation of moisture from the atmosphere on cold steel cargoes, and it cannot prevent the spontaneous heating of goods, which contain an excessive amount of moisture from the start. Furthermore it cannot deal with any free moisture that may be brought in the hold by way of wet cargoes, rain, sea-water.

In view of the limited value of a permanent insulation and its high maintenance cost we are inclined to recommend its use for only notorious locations, such as hot boiler room bulkheads, hot shaft alleys and cold bulkheads next to refrigerated spaces.



G. E. Horsepower meter.

NEW ELECTRIC TORSION METER

Of exceptional interest to marine engineers, whether they be on passenger liners, ore carriers, tankers or tugs, is the announcement of a new electric meter developed by General Electric engineers for giving accurate and instantaneous measurements of shaft-horsepower and horsepower-hours. With the new device, the engineer can check the performance of his propulsion equipment over a wide range of speeds, can compare the fuel consumption with horsepower-hours output under varying conditions, and, in general, can check the efficiencies of boilers and other equipment. Readings can be taken directly from the scale on the dial of the meter, thus eliminating the need for conversion formulas and tables.

Thus far this equipment has been used by the Sun Shipbuilding and Drydock Company for checking the performance of the power plants on its new ships. Other service at sea demonstrates that it will operate successfully under severe conditions and still maintain its accuracy.

The new meter consists essentially of two electric generators, mounted on the propeller shaft and connected to indicating devices which can be located any distance away. The generator rotors are built in halves which are assembled on the shaft after the shaft has been installed in the ship. The stator bearings are also made in halves, so that the stator structure is assembled on the rotors after they are in place. The stator is restrained from rotating by a bar pinned at one end to one side of the stator and at the other end to a bracket on the ship's structure. This arrangement allows sufficient flexibility to provide for lateral or vertical motion of the shaft without disturbing the relative position of the rotors and stators.

The stators of each generator are initially adjusted so that, when no torque is being transmitted by the revolving shaft, the voltages generated by the two generators are exactly 180 degrees apart in phase. Thus these voltages balance each other so that the resultant voltage is 0 and the indicator hands stand at 0 on the dial. When a load is placed on the revolving shaft the torque will cause a small amount of twist in the shaft. Thus the two voltages will no longer be 180 degrees out of phase and the resultant voltage, being proportional both to the shaft twist and to the propeller speed, will register on the indicator as horsepower.

The entire unit is completely self-contained and no external source of power is needed. It can be easily installed, requires little attention, and its calibration can be easily checked at any time.

Tanker St. Clair

(Continued from page 49)

Cargo oil tanks are protected by a Union Oil Company system of flue gas coverage. In this system the flue gases are washed and cooled and used to fill the ullage spaces at the top of the oil tanks.

• Navigation and Communication

Mackey Radio and Telegraph Company furnished the radio equipment for this tanker. In the radio room is a 200 watt intermediate frequency transmitter, a 200 watt high frequency (short wave) transmitter, a 50 watt emergency transmitter, and receiving equipment consisting of one all-wave main receiver, one standby intermediate frequency receiver and a crystal receiver. Also in the radio room there is a panel in which are mounted the Mackey Radio auto alarm, power supply and main feeder switch boxes and control units. All wiring was installed in deck and deckhead channels with the bulkheads left entirely free and clear.

Mackay Radio also supplied a type 105-A Kolster Radio Direction Finder, which is installed in the chart room.

The navigation equipment is very complete, including: Sperry Gyroscopic master compass and three repeaters; Sperry course recorder; Sperry Gyro Pilot; Submarine Signal Company Fathometer; and an electric sounding machine.

Naco cast steel stud link anchor chain was furnished by the National Malleable & Steel Castings Company.

Leslie "Tyfon" whistles were installed and Leslie automatic control for fog signaling.

A First Rivet

(Continued from page 37)

distinguished" riveting gang composed of E. C. Mausshardt and David Currier, both associated with the U. S. Maritime Commission, and H. E. Frick, operating manager, and Reginald Laughlin, general counsel, both of the American President Lines.

Immediately following the keel laying ceremony occurred the christening and launching of the steel hull of the lighthouse tender Walnut. As shown in the illustrations, this vessel took the water very gracefully after being efficiently christened with the breaking of a bottle of California champagne over her bows by Miss Virginia Gordon Hughes of Salinas, California.

Four days later, on March 22, a duplicate lighthouse tender was christened Fir by Miss Harriet Mason of Sacramento, California, and quietly lowered into the waters of the estuary through the operation of the marine railway on which she was built.

The tender Walnut is to be delivered at Detroit for service on the Great Lakes, and her sister, the Fir, will be delivered at Portland for service on the Northwest Coast.

Thus Saturday the eighteenth of March, 1939, will be recorded in history as the date that initiated a renaissance in the steel shipbuilding industry on the Pacific Coast.

WHAT!
NO MORE *SAND* ALONG BANDON BAR?

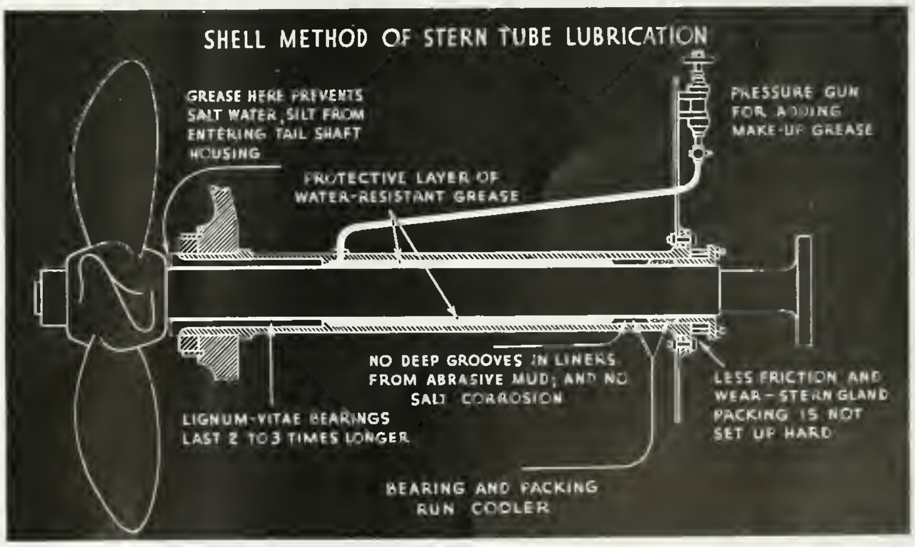
Port Manager Walstrom claims his new tug's stern tube hasn't shown any wear yet, thanks to Shell's new method of sand-proof lubrication!

ANYBODY that's crossed the rough, shallow bar at Bandon, Ore., knows what J. E. Walstrom is up against. On the tugs he uses to tow lumber steamers across this dirty water, grit and sand filter up into the stern tubes. Causing stern shafts to wear and pit.

Recently, Port of Bandon built a new tug. How could costly stern tube trouble be reduced in this boat? Someone told Mr. Walstrom about Shell's method of stern tube lubrication with a water-resistant grease.

He had Shell's system put in. Now writes Mr. Walstrom: "Shell's method of lubrication keeps water from entering the tug through the stern tube. We have no trouble of shafts pitting. We are confident that wear on the stern bearings has been reduced to the minimum."

Shell's new method of stern tube lubrication is saving ship owners thousands of dollars in replacements. It can be installed in a few hours. Phone nearest Shell office for details. Or write Industrial Lubricants Division, Shell Building, San Francisco, California.


SHELL METHOD OF STERN TUBE LUBRICATION
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PRESSURE GUN FOR ADDING MAKE-UP GREASE
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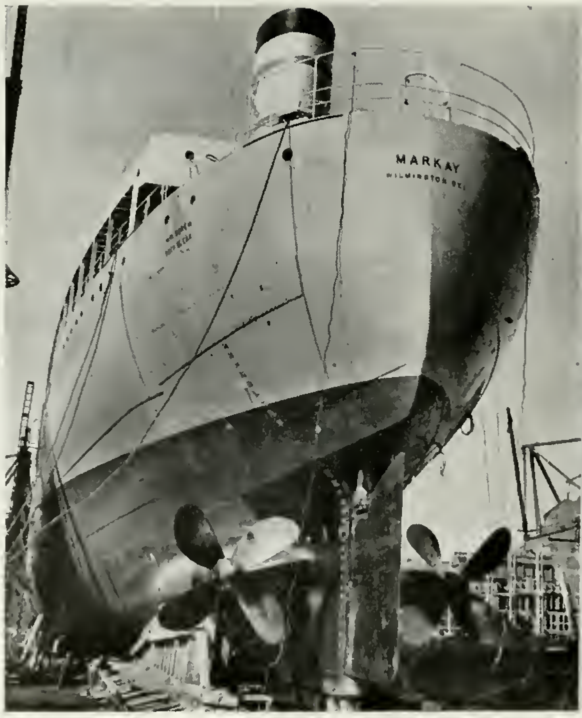
GOLDEN SHELL MARINE MOTOR OIL

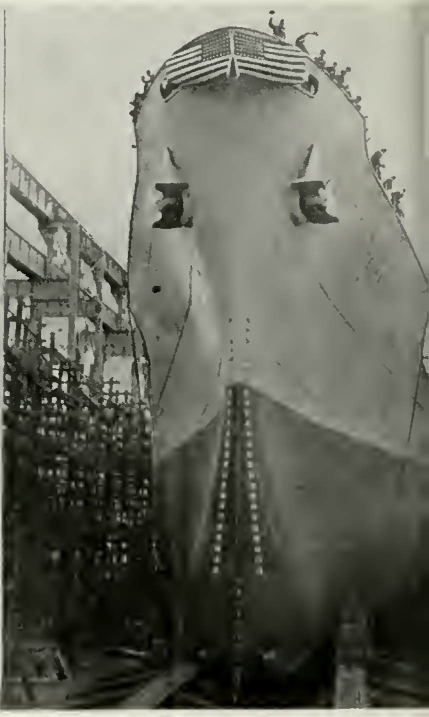
On the Ways

The outstanding event during March in the shipyards of the Atlantic Coast of the United States of America occurred on March 4 when two of the big, fast defense-features tankers were launched, one at the Federal yard, Kearney, N. J., and the other at Sun yard, Chester, Pennsylvania. Above, left: Mrs. Howard L. Vickery, sponsor for the Seakay, and her daughter Barbara; right: Mrs. C. Kurz, sponsor for Markay. Below are a stern view of the Markay on the ways ready for launching and a bow view of the Seakay sliding down the ways.

Launching party for both ships. Left to right, top row: Karl Kurz, Commander Howard L. Vickery, Admiral Leo O. Colbert, Captain Howard and Karl Klitgaard; middle row: R. R. Griffen, Charles Kurz, Mrs. L. H. Korndorff, Robert F. Hand, Mrs. W. C. Hemingway, Robert L. Hague and Miss Howard; bottom row: L. H. Korndorff, Adolph Kurz, Mrs. R. R. Griffen, Mrs. Howard L. Vickery, Miss Barbara Vickery, Mrs. Charles Kurz, Mrs. R. F. Hand, Mrs. Leo O. Colbert, Mrs. C. W. Bryant, C. W. Bryant and Mrs. J. C. Craven.

This picture was taken at the Federal yard, Kearney, New Jersey.





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capacity
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GENERAL ENGINEERING and DRY DOCK COMPANY

DECELERATION AND ACCELERATION OF SHIPS AT SEA

III INTERMITTENT DECELERATION

By D. W. Dickie

A common condition of deceleration is where a ship runs into a patchy fog and the order is given for half speed. The engine is reduced in revolutions to that generally used for half speed and the ship gradually decelerates with the propeller turning until the slip runs up to 15 per cent, say. After proceeding at half speed the fog becomes thicker and the order is given for slow speed. The engine is set at the revolutions for slow speed and the ship decelerates until the slip of the propeller again comes up to 15 per cent, say. After proceeding for a while a whistle is heard and the order "stop" is given, the propeller being held still ready for the next command. Suddenly a ship appears out of the fog and the order is given for full speed astern, whereupon the ship decelerates to rest. This introduces two additional conditions; a vessel coasting with the propeller being turned by means of the engine at insufficient revolutions to maintain the initial speed of the vessel and the propeller held still, retarding the speed of the vessel.

The speed of the vessel is taken from the log and decelerated along the coasting curve (propeller turning 22 per cent) until half speed is reached. Then run at half speed until the slow speed order is given; decelerated along the coasting curve (22 per cent) until slow speed is reached. Then run at slow speed until the stop order; and decelerated along the coasting curve with the propeller held still (32 per cent) until full astern. Then decelerated along the full speed astern curve (100 per cent) until rest.

It was shown in the paper on "Deceleration" that theoretically at least there was a relationship between the (100 per cent power) deceleration curve and the curve of deceleration of a ship coasting to rest with respect to distance traveled, which suggested a search using smaller percentages of the full power reversing.

The writer has not had an opportunity to test the conditions in the exact form of the mathematical deduction but has been able to elicit from opposing witnesses, who have made such experiments in part, sufficient information to check the figures within 2 or 3 seconds.

● An Interesting Example

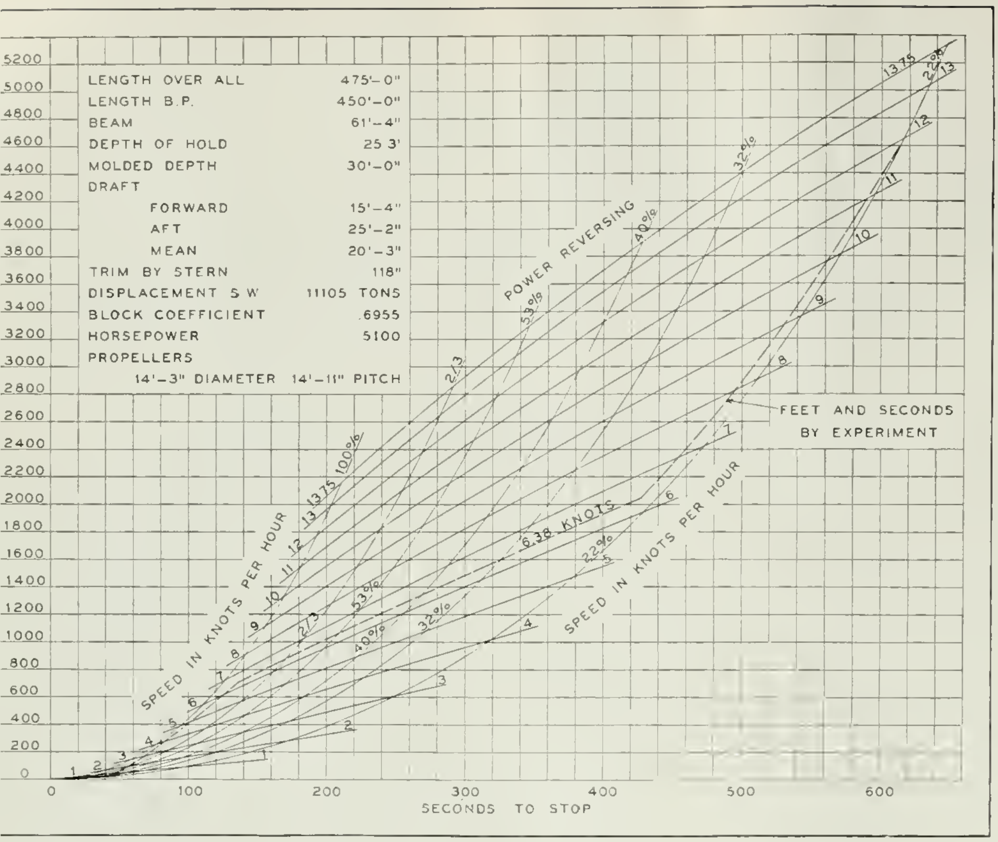
An interesting case is illustrated of a ship fitted with twin diesel engines that was brought to rest by letting the engines decelerate with the fuel shut off until the ship came down in speed to a little over 6 knots, after which the engines were reversed and brought the ship to rest.

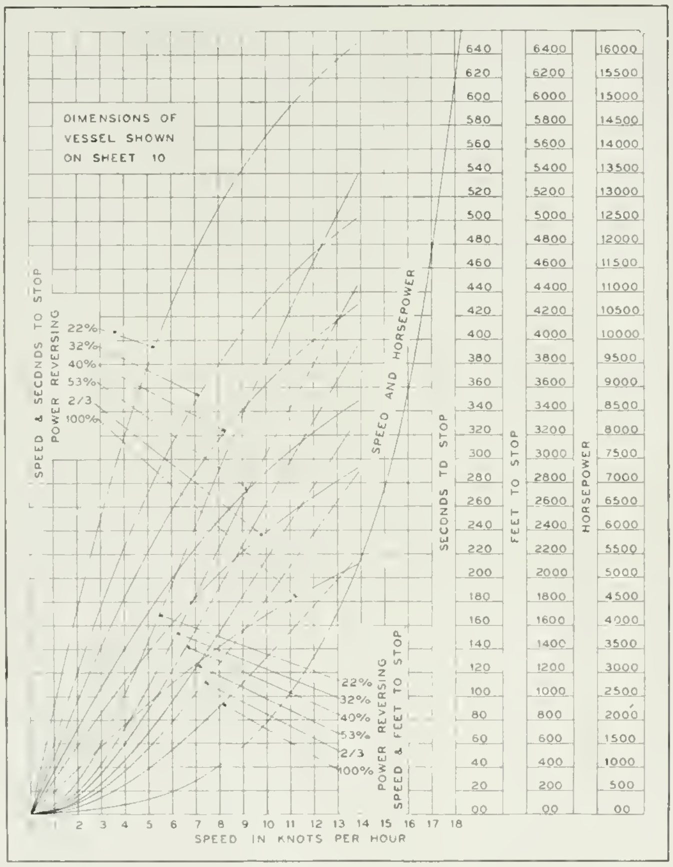
Sheet 9 was calculated using all the powers reversing, having speed as the base with feet to stop and seconds to stop as the ordinates.

Sheet 10 was then plotted with seconds to stop as the base and feet to stop as the ordinates, cross curves of speed being plotted as shown.

Sheet 11 was plotted from the deceleration experiment of the ship. The writer with the aid of the ship's officers took the data on deck and Paul L. Joslyn recorded the engine data with the aid of the engine room officers.

When the fuel was shut off the port engine revolutions dropped from 108 r.p.m. to about 60 r.p.m. and gradually decreased along an almost straight line to a sudden stop.



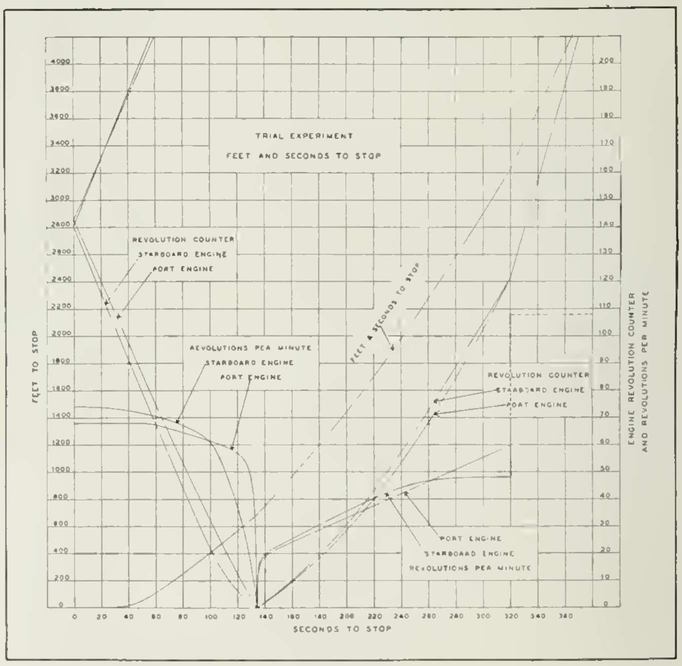


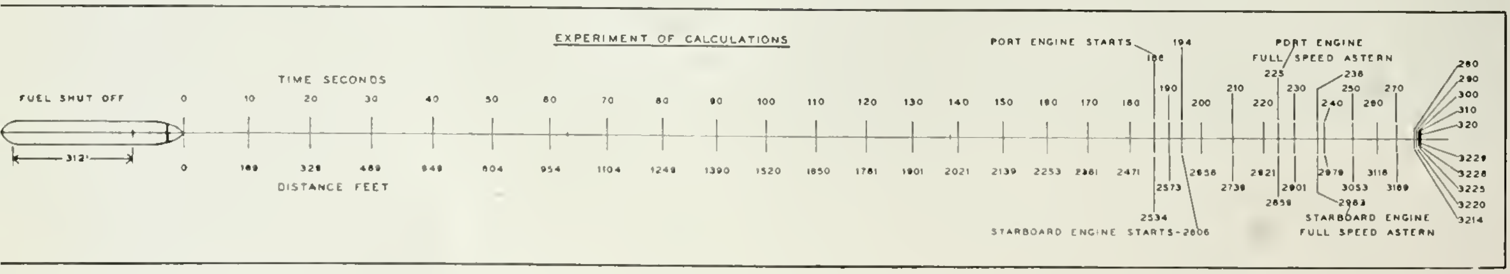
Above: Sheet 10.

At left: Sheet 9.

At right: Sheet 11.

At bottom: Sheet 12.





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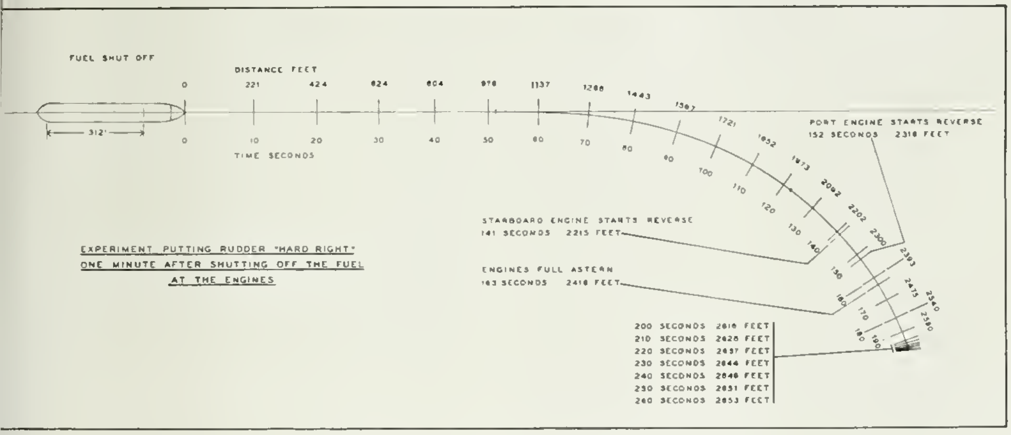

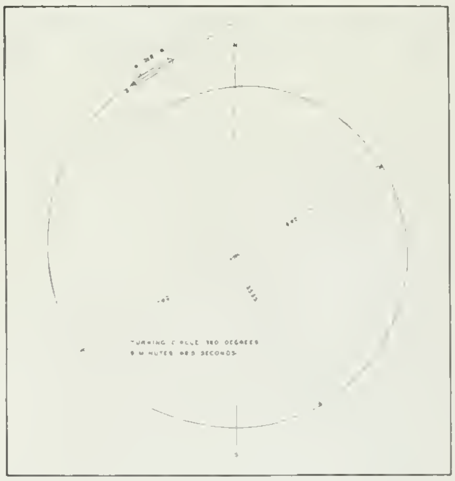

Sheet 13 above and, at right, Sheet 14.

When the engine was reversed the revolutions increased suddenly up to about 57 r.p.m. and then increased gradually to 68 r.p.m., which were the maximum revolutions reversing. The starboard engine dropped from 108 to 48, remained at 48 for about 60 seconds, then gradually decreased to a sudden stop. When the engine was reversed the revolutions increased suddenly up to about 60 and then gradually increased to 74.2, which was the maximum revolutions reversing.

The engine was fitted with two fuel nozzles ahead and one fuel nozzle astern. The starboard engine was "stiffer" than the port engine, but some fuel valves must have been leaking to furnish power to maintain the revolution curve as it is.

Obviously the behavior of the propelling machinery does not follow the premise laid down in the calculated curves. For a very short interval the machinery was turning in accordance with the 22 per cent curve but did not approach the 32 per cent curve, as at no time was the propeller held still for an appreciable interval. However, the experiment curve is superimposed upon Sheet 10, disclosing a variation consistent with the gradual decrease in revolutions shown on Sheet 11.

The other experiments disclosed that the engines did not display any tendency to be consistent in their deceleration attributes, and all that can be said is that the curves shown are an approximate average.

If we could assume that the engines would come to rest in approximately 3 minutes every time, it would be possible to work backwards from the propellers, but lacking that assurance a result sufficiently accurate can be arrived at by plotting the 22 per cent curve and modifying the slope practically in accordance with the superimposed line on Sheet 10. The revolution curve with the engines reversing also does not agree with the premise upon which the calculation is based.

The observations on deck were taken by stationing a man just forward of the bridge. At a signal from the captain, a paper board box 2 feet cube was tossed overboard. As it passed the after bridge at the poop a signal was given and another box was tossed overboard, and this was repeated until the ship came to rest. The bridge is used as the fore end point to get clear of the wave formation at the bow, and similarly the after point must be kept clear of the after wave formation. From the known distance between the two bridges, a recorded time and compass reading, the curve was plotted. Near the finish the last box was followed aft and the time noted as it passed various stanchions along the ship's side. The distance from the bridge to the stanchions was measured later. The end point was determined as usual by noting the time for the last 6″ approximating the stop point and noting the time for the 6″ that the ship backed away from rest.

The similarity of the deceleration and acceleration curves near the end point should give a perfect end point. However, attention is called

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to the usual drop in initial speed due to the wave subsidence, a drop in speed at reversal and the unfairness of the deceleration curve at the lower end caused by free liquid in the ship.

Sheet 12 gives the plot of the deceleration, which is the subject of the calculations.

Sheet 13 gives the plot of the deceleration with the added feature of putting the rudder "hard right" one minute after the fuel was shut off.

Sheet 14 gives the plot of the turning circle, the engines being kept as close as possible to "full speed ahead." There is a drop in speed on account of part of the energy being utilized to make the turn.

In all cases it is possible to make the turn in less distance than the ship can be brought to rest, regardless of the power and speed of the ship.

ANOTHER SALVAGE JOB WELL DONE BY HAVISIDE

A recent important salvage operation by the Haviside Company of San Francisco was the removal of the sunken tug Virgil G. Bogue from the bottom of the Oakland Estuary and her removal to a point off of Angel Island in San Francisco Bay for disposal in deep water.

The Haviside Company was awarded this salvage contract, being low bidder, from the U. S. Engineer Corps.

The Haviside derrick barges Nos. 4 and 5 were used in this unusual job with the aid of the Haviside tug H. T. Haviside. As you will see in the accompanying photograph the two salvage barges were placed directly over the submerged tug which was upside down on the bottom of the Estuary.

First operation was to send divers down to place slings around the hull so as to roll the tug into upright position. After this was completed special slings of Columbia Steel Company's wire rope were used for lifting to the surface. When raised sufficiently by both barges to clear the bottom, the two barges, with the still partly submerged hull suspended between them, were towed drawing 27 feet through the Estuary and out into deep water.

Thus the Haviside salvage fleet successfully performed another service to Pacific shipping—this time removing a serious menace to navigation!

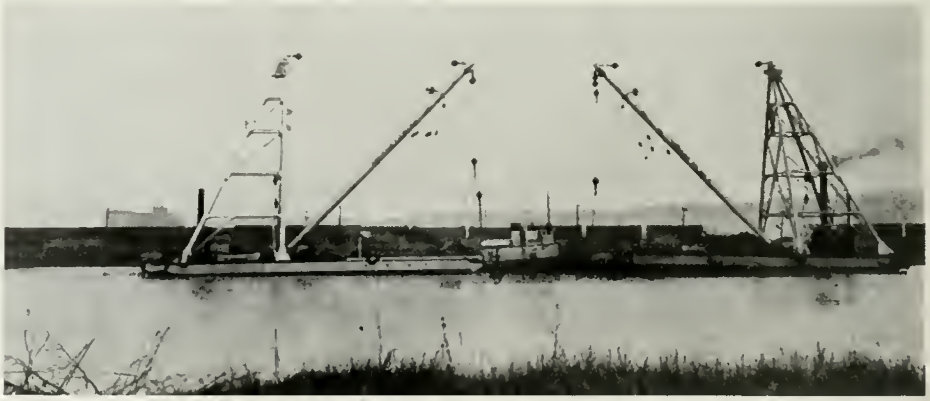
● Close Observation

First Seaman—"Did you know that our boatswain's mate has a glass eye?"

Second Seaman—"No; can you tell which one it is?"

First Seaman—"Sure, you look at both his eyes real hard and the one that has a sympathetic look in it is the glass one."

—Tennessee Tar.



Haviside derrick barges Nos. 4 and 5, and tug H. T. Haviside, raising the sunken tug Virgil G. Bogue from bottom of Oakland estuary.

Running Lights of Pacific Shipping

FLOYD W. ELLIOTT

Floyd W. Elliott, manager of Schafer Bros. Steamship Lines, operators of lumber carriers in the Coastwise service. Born in New York State, he attended the University of Rochester and the University of Chicago. His first appearancé in the lumber business (part of the Schafer organization's interests) was with the Monarch Lumber Company, Saskatchewan, in 1912. Coming to California in 1913, he returned to the lumber business in the following year with the San Joaquin Lumber Company at Stockton, leaving there to do a bit of railroading with the Santa Fe. After a couple of years he was with Pope & Talbot in San Francisco . . . then, in 1922, with Chas. R. McCormick Lumber Company in the same city, covering the Bay district for them for nearly 11 years. Treasurer of the S. F. Lumber Salesman's Club for many years. When Schafer opened San Francisco offices in 1933, Mr. Elliott was appointed manager. Married. A son and daughter attend University of California. Nearly 25 years in the lumber business in Northern California have made him one of the best known and liked executives in the business.

W. R. MARSHALL

W. R. Marshall, vice president in charge of Westinghouse activities in the nine Western States comprising the Pacific Coast District of the company, has been associated with Westinghouse for nearly 30 years, having been employed immediately upon graduation from North Carolina State College in 1909.

After serving two years on the apprenticeship course at East Pittsburgh, he entered the Sales Department in the New York office. In 1920, he was appointed Manager of Industrial Sales. The following year, he was transftrred to the Buffalo Office in the capacity of Branch Manager. In 1926, Mr. Marshall was made Pittsburgh District Manager. Two years later, he was again transferred, this time to San Francisco as Pacific Coast District Manager. In 1930, he was appointed Commercial Vice President, and shortly thereafter was elected Vice President.

Mr. Marshall is a director of the San Francisco Chamber of Commerce and of the Golden Gate International Exposition. He is a member of the Bohemian Club and San Francisco Golf Club .

WILLIAM A. McGILL

William A. McGill, vice president and general manager of the De Laval Pacific Company, West Coast representatives of the De Laval Separator Company.

Came to San Francisco main office of De Laval Pacific Company in 1934 from New York headquarters of "the separator company".

Had served six years in New York in the sales engineering and industrial division.

From 1934 to 1938 held the position of industrial sales manager for the Pacific Coast.

McGill was graduated in mechanical engineering from Carnegie Institute of Technology. He was born in Pittsburgh, Pa.

His hobby is mechanical model building.

Propeller Club of California

News of the Month

Luncheon Program

On March 7th, **Warren K. Pillsbury,** Commissioner of United States Employees Compensation Commission, was introduced as guest speaker by **Byron O. Picard.** His subject "Longshoremen and Harbor Workers Compensation Act" proved exceedingly interesting . . . one of our best programs of the season.

Chairman of the Day Picard heads up the Safety Committee of the Pacific American Steamship Association.

● IN MEMORIAM

It is with regret that we announce the passing of our fellow member and true friend, **Mr. Robert L. Hague,** who through sheer ability rose from a humble place to a position as head of one of the largest shipping companies in the world. A thorough sailor, a great engineer, and a real man has gone to his Maker.

President C. E. Finney has announced the set-up of the following committees:

Membership Committee: Harry Scott, chairman; H. H. Brann, Fred Doelker, H. T. Haviside, V. W. Hoxie, C. M. Le Count, S. A. Livingston, Ralph Myers, T. A. Short. Legislative Committee: L. L. Westling, Chairman; George Eggers, S. W. Fenton, W. Edgar Martin. Golf Committee: Arthur Donnelly, chairman; Arthur Forester, B. L. Haviside, C. M. Le Count, Carroll Reeves, Fred Ritchie, John Thies. Entertainment Committee: E. J. MacFarlan, chairman, Howard Bernhard, Robert E. Christy, Frank DePue, Bern DeRochie, M. Gilmore, R. H. Glissman, J. Lalor, Fletcher Monson, Harold Weule. Publicity Committee: Paul Faulkner. Annual Fishing Derby Committee: E. A. Williams, chairman; F. H. Evers, F. H. Fox, Hugo Paladini, James Vizzard. Scholarship Committee: Capt. C. L. Meek, chairman; Capt. Henry Blackstone. Auditing Committee: Herman Nichols, chairman; John Parker, George Swett.

Looks like a big night, shipmates! Everybody will be on deck . . . from present surveys!

It's the Tenth Annual Spring Banquet of the Propeller Club of California. Imagine three hundred of your good pals—in the Marine Room of the new Municipal Aquatic Park. A grand setting—take it from us. We've seen it!

The date is Saturday, May 6th. Stanley E. Allen, our "sparkplug" secretary says:

This will be one of the greatest events ever sponsored by the Club. Reservations are going fast. It is suggested that members enter their names for themselves and guests on the passenger list at the earliest possible date so as to assure that they will be aboard for this memorable voyage.

Lt. Com. Frank S. M. Harris, administrative officer of the U. S. N. R., spoke March 21st on the Relationship of the Navy to our Merchant Marine.

The Speaker's talk was well received—and particularly enlightening was his outline of the development of naval reserve activities in our local district.

●Dahl-Beck in New Location

Jerry Lalor, associated with Dahl-Beck Electric Company in San Francisco, is inviting friends of the firm to drop in on the new quarters.

Dahl-Beck are now at 118 Main Street.

● It's a Boy!

Gene Hoffman, popular public relations man of American President Lines, recently passed around the cigars.

The occasion: a father for the fourth time!

The time: St. Patrick's Day in the mornin'. They named it Pat!

● Harms Launching

Edward H. Harms is weaving a beatific smile these last few days while making his rounds on California, Market and the Embarcadero. A son has arrived!

The "papa-ular" assistant operating manager of McCormick Steamship Company is the same chap whose honeymoon was chronicled in these pages just two years ago. Seems just yesterday that the Board of Governors of the Propeller Club of California was selecting a wedding gift for its then president.

The young hopeful and the little mother are at the Peralta Hospital in Oakland at this writing . . . and are expected to join Ed at the family rancho on Monterey Avenue in Berkeley in a few more days. Ed confided to this scribe ahead of the natal event that he didn't care whether the new arrival was masculine or feminine . . . "as long as it's a boy!"

Ed Peltret, widely-read marine columnist of the Chronicle, reported that Father Harms was passing around the see-gars . . . but thus far your P. M. R. scrivener can't verify this statement. Knowing Peltret's rep for factual utterances we accept the remark as gospel. (We'll settle for a Chesterfield!)

Junior . . . here's good luck to you! May you steer a long, happy course on your voyage and may you emulate your dad . . . "in there pitching all the time!"

AMERICAN PRESIDENT LINES RESIGNATIONS

George S. Hinkins, vice president in charge of Eastern territory and working offices in New York, and **David Hopkins,** Washington representative, have tendered their resignations to the American President Lines, according to advices received the middle of March. **Thomas E. Cuffe,** assistant vice president and freight traffic manager, is in New York temporarily filling the post vacated by Mr. Hinkins, where he will remain until a permanent appointment and readjustment of the staff is effected.

Mr. Hinkins and Mr. Hopkins are opening a new steamship agency in Baltimore, and have already secured two lines, the Isbrantsen-Moeller Line and the Pacific Direct Line, the former operating from Baltimore to the Far East; the latter, a unit of the Weyerhaeuser interests operating in the intercoastal trade.

Tubbs Exhibit Attracts Crowds

One of the exhibits that has been attracting unusual attention at the Golden Gate International Exposition on Treasure Island in San Francisco Bay is that of the Tubbs Cordage Company, pioneer rope manufacturers of the West.

This highly effective display, occupying over 60 feet of aisle space in the Palace of Mines, Metals and Machinery, is carried out with modern design and lighting effects and features actual rope making machinery in operation. There all day long crowds of interested spectators watch the yarn being spun and rope strands being laid into completed rope.

A background of colored photographs depict fibre scenes and the stages in fibre preparation up to the time it becomes rope yarn. Supplementing this, are constantly changing colored slides showing further scenes of rope making and the use of rope in industry.

Thousands of booklets and knot folders have been distributed by Tubbs Cordage Company during the opening weeks of the Exposition to interested spectators who indicated interest in Tubbs well-known products.

PORT SPEAKER

Honorable J. F. Marias, president of the State Board of Harbor Commissioners, was the guest speaker at the dinner meeting of the Oakland Foreign Trade and Harbor Club, April 6th, Hotel Coit.

His subject was: "Duties and Responsibilities of a Port." Particular mention was made in reference to the responsibilities of a Port to the communtiy, to the Nation, its work in trade promotion and our need of a strong merchant marine.

Lloyd Hughes, the Club's traveling Ambassador of Good Will, gave a report on his recent trip to Honolulu. **John A. Sowers** gave a short report on current events affecting Foreign Trade, and Carl Olson answered some problems taken from the Question Box.

President Cliff Buell called the meeting to order promptly at 6:30 p. m.

News of "The Bilge Club"

By William A. Mason

Lieut. Commander, U. S. Navy
(Retired)

The Eleventh Annual Banquet of the Bilge Club, Los Angeles Harbor Shipping Fraternity, was held at the Biltmore Hotel, Los Angeles, on Saturday Eve., February 25th.

No set program of speeches was followed, outside of an address of welcome by President Art Pegg.

Festivities commenced at 6:30 with a gathering outside the banquet room for the loading of "wet cargo." This was followed by dinner during which the members were entertained by Dick Armstrong's orchestra.

After the dinner a program of entertainment was presented consisting of many novel acts under the guidance of Ed Foley as Master of Ceremonies.

The balance of the evening was devoted to renewing old acquaintances and general good fellowship.

Pabco Appointments

Two men from as widely varying backgrounds as can be found in American industrial life were today named to manage the huge Pabco plant at Oakland by **W. H. Lowe,** president of The Paraffine Companies, Inc.

James T. Coleman, who started with the firm as a union mechanic more than a quarter-century ago, was named General Superintendent. He had been master mechanic, plant engineer, and later, Assistant General Superintendent. He is well known in Emeryville as a city councilman and president of the school board and as a leader in civic and industrial affairs.

Ford Tussing, graduate of the Stanford Graduate School of Business Administration, was appointed Assistant Superintendent. Joining the firm in July, 1926, he has served as head of the Statistical Department, Assistant Office Manager and Manager of Production Control.

Cordes Appointed for Xzit Sales

Howell Ware of Xzit Pacific Company, is announcing the appointment of **Cordes Brothers**, San Francisco marine-supply firm, as selling-service agents in the San Francisco Bay area.

The selection of this firm headed by **John Cordes** is a happy one as Mr. Cordes and his organization are in an exceptional position to service the many steam power plants at this harbor. John Cordes is particularly impressed with the results obtained by East Coast operators and their shipboard personnel through the proper use of this soot and firescale eradicator. Before taking on the sales responsibility he has studied the records of many leading tankship and merchant ship companies to the degree that he is bringing splendid enthusiasm to the job of placing XZIT in Pacific Coast boiler rooms.

Jack Govan, president of the parent XZIT Sales Company, has been on the Coast for several weeks during which time he has visited Seattle, Portland, San Francisco and Los Angeles fronts.

Mr. Govan reports fine business with oil-transportation companies and states that his firm is receiving encouraging orders from overseas sources. The XZIT Chief will motor homeward via the Gulf district.

JOHN CORDES

Joseph Haag, Jr.

•

Joseph Haag, Jr., President of Todd Combustion Equipment, Inc., 601 West 26th St., New York City, was recently elected a director and vice-president of Todd Shipyards Corporation, 1 Broadwayy, New York, N. Y. Mr. Haag also is vice-president of Todd Seattle Dry Docks, Inc., and a director of the Robins Dry Dock & Repair Co., Brooklyn, and Todd Combustion Equipment, Inc.

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Names & News

Earle F. Hiscock has joined the organization of Mr. V. M. Friede, Naval Architect of New Orleans. Mr. Hiscock is a graduate of the Massachusetts Institute of Technology in the Department of Naval Architecture and Marine Engineering and late Chief of the Inspection Division as Assistant to Captain H. C. Shepheard, assistant director of the Bureau of Marine Inspection and Navigation, U. S. Department of Commerce.

Mr. Friede is the designer of the three fast combination cargo and passenger ships now under construction for the Mississippi Shipping Company of New Orleans. The ships are being built at the Sparrows Point Plant of the Bethlehem Steel Company at Baltimore, and will be placed in service in the Delta Line's trade between New Orleans and South America ports.

CHARLES A. CRONKHITE

A very desirable post in private industry led to the resignation of Charles A. Cronkhite as traffic manager for the Los Angeles Harbor Department, a position he has filled for the past six years. The resignation becomes effective on May 16, and latest reports assert that the post of traffic manager will not be filled immediately, owing to economy moves in all city departments.

After spending some ten years in the passenger department of Grace Line, Stanley Pearse has been transferred to the company's El Salvador headquarters. Through his activities in travel affairs Mr. Pearse has become one of the most promising Pacific Coast executives who began their careers with San Francisco navigation companies. The motorship Rialto, on which Mr. and Mrs. Pearse left for the Central American post, sailed from San Francisco on March 16.

HUGH MIDDLETON

Hugh Middleton, former general freight agent at Los Angeles for Panama Pacific Line, resigned that post on February 23 to become manager of the new American Philippine Line to inaugurate two transpacific freight services in March and April via Los Angeles. Offices have been opened in the Security Title Insurance Building, 530 West Sixth Street, in that city. The International Harvester Co., the Swedish East Asiatic Co. and the recently established de la Rama Steamship Co. (owned by Philippine sugar interests) are affiliated with the new line. Mr. Middleton spent eight years with Panama Pacific, and ten years with Swayne & Hoyt and Luckenbach.

The post of general freight agent at Los Angeles for Panama Pacific, resigned by Mr. Middleton, has been filled by his former assistant, **J. D. Baker.**

Safety ON EVERY SHIP!

The McDonald HOSE MASK

Gives complete safety against all poisonous fumes and gases in holds and other confined places aboard ship.

Every vessel should be equipped with the McDonald Hose Mask — for safety's sake. Enables men to enter tanks and all other confined places in complete safety regardless of the nature of gases or fumes. Mask is efficient, yet comfortable. Waterproof trunk holds complete unit, including easily operated blower, safety harness. Approved by U. S. Bureau of Mines. Write for complete details.

McDONALD PRODUCTS

McDonald Unit First Aid ◆ Goggles ◆ Safety Belts ◆ McDonald All-Service Mask ◆ McDonald Approved Ammonia Mask ◆ McDonald Industrial Masks ◆ McDonald Safety Hats ◆ Combustible Gas Indicators and Detectors ◆ Self Contained Oxygen Breathing Apparatus ◆ Safety Clothing ◆ Approved Flashlights ◆ Dustfoe Respirators

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2321 MILAM STREET • • HOUSTON
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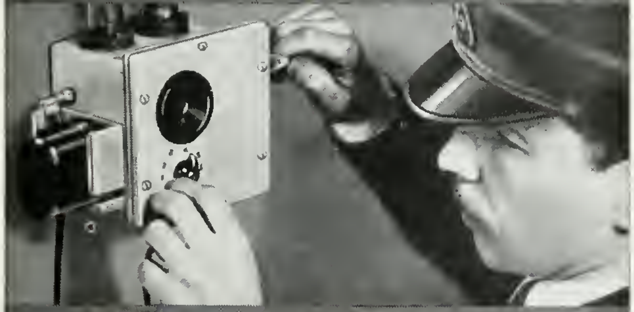
NEW TELEPHONE

For Intercommunication on Shipboard

NEEDS NO BATTERIES



Western Electric

VOICE-POWERED TELEPHONE

approved for intercommunication on shipboard by U. S. Dept. of Com.

Bell Telephone Laboratories developed this new dependable telephone. It is powered by the speaker's voice alone, yet provides high quality transmission.

You can converse clearly with any one of five other locations on board. Each unit of this simplified telephone is compact, rugged and waterproof.

GRAYBAR ELECTRIC CO., Graybar Building, New York PMR-4-39
Gentlemen: Please send me bulletin describing the new Western Electric 11A Voice-Powered Telephone.

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CITY............ STATE............

F-M DIESEL CASE HISTORIES

★ ★ ★ So Captain Martin Chose Another F-M DIESEL ★ ★ ★

Although admitting a sentimental liking for steam, Captain Jacob Martin is a realist in matters of business. It was he who brought the first steamer into Sheepshead Bay, Brooklyn, and converted her to Fairbanks-Morse Diesel power. Low operating cost and stamina of this engine proved entirely satisfactory. Therefore, when losses and delays, caused through steam operation, necessitated a change of power aboard the *Sachem,* the Captain again chose a Fairbanks-Morse Diesel.

The *Sachem* is now propelled by an 805-hp. 7-cylinder Fairbanks-Morse Diesel, which was installed without bulkhead changes. The engine room is now well-lighted and conveniently arranged with easy access to all machinery. Power for all purposes when the vessel is not under way is provided by Fairbanks-Morse Diesel auxiliary set consisting of 20-hp. Model 36 engine, 12-kw. generator, 70-g.p.m. fire and bilge pump, and 12-cu.-ft. air compressor.

For propulsion or auxiliary power for large boats or small—for new or conversion jobs, *come to Diesel Headquarters* where marine Diesels are built for marine service from the bedplate up. Write Fairbanks, Morse & Co., Department 109, 600 South Michigan Avenue, Chicago, Illinois. Branches with service stations in principal ports.

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RAILROAD EQUIPMENT

WATER SYSTEMS
WASHERS-IRONERS
FARM EQUIPMENT
STOKERS
AIR CONDITIONERS

Diesels

New Surveying Firm

Porter & Thorne, marine surveyors at the port of San Francisco, have announced the opening of offices at 260 California Street in which their associate will be **K. M. Walker,** marine surveyor, consulting engineer and naval architect.

The newly organized group will specialize in hull, engine and boiler, general condition and appraisal surveys.

David Porter and **E. E. Thorne,** well known in Coast maritime circles, are licensed master mariners. Porter, formerly a lieutenant in the U. S. Navy, has had fine merchant marine experience with Pacific Mail, Grace, Panama Mail and Dollar. He was later associated with **E. C. Generaux** in marine surveying work and served as relief surveyor for the Board of Marine Underwriters, San Francisco.

E. E. Thorne, for sixteen years licensed officer on prominent Pacific Coast ships, rolled up a record of twenty-six round-the-world voyages on Dollar liners. He also served as deck officer on Panama Mail Ships in intercoastal and Central American trades.

Kenneth M. Walker needs no introduction to P. M. R. readers as his manuscripts contributed to our columns date back to his early days in Seattle where he received the excellent tutelage of his father, Frank Walker, renowned consulting engineer. Mr. Walker's experience later brought him into the Chicago district where he functioned as surveyor to Lloyd's. He, too, has a sea-going background as well as an inherent liking for the Pacific seaboard which latter "urge" prompted his return to the Coast and led directly to the present affiliation.

(Above photo and front cover views by Gabriel Moulin.)

Happy Days here again!

Joseph A. Moore, president of Moore Dry Dock Company of Oakland, and Treasurer Nat Levy affix signatures to bonds covering the construction of two C-3 type freighters for U. S. Maritime Commission. This gathering witnessed the impressive signing on March 3. First keel for the big contracts was laid on Saturday, March 18, as depicted on our front cover, this issue.

CAPT. IRVING A. DURKEE

Long secretary of the San Francisco Pilot Commission, Capt. Irving A. Durkee passed away on March 23 at the age of 69. He was one of the old sailing ship masters, born in Nova Scotia and coming to California when a young man. For many years he sailed in and out of San Francisco before becoming permanently identified with Rolph Navigation and Coal Company. His last command was the Annie M. Rolph, and when Governor Rolph was elected, Capt. Durkee, a friend of the late governor, was named secretary of the Pilot Commission.

A. L. SCHMALZ

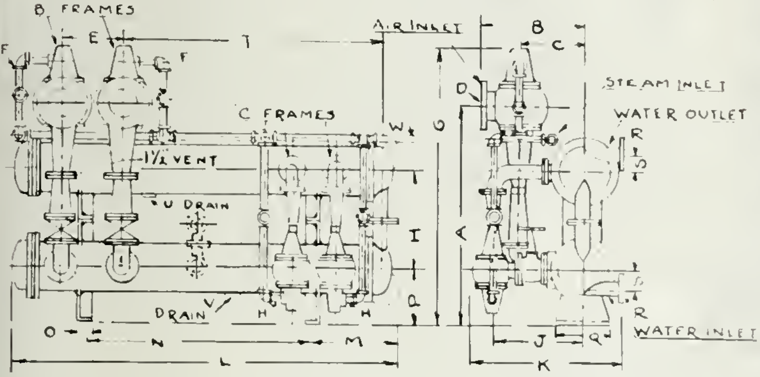
A recent appointment is that of A. L. Schmalz, veteran San Francisco steamship man, to district passenger agent for the Alaska Steamship Company, with headquarters in the Dollar Building. He served the old Pacific Steamship Company for twenty-six years, and during the past four years was with the old Dollar Line. When the latter became the American President Lines Mr. Schmalz was transferred into the Alaska Steamship Company.

Radio Exhibit at World's Fair

Artist's conception of how 53-foot Elco motor yacht, equipped with modern RCA radio devices for communication and safety at sea, will appear in the RCA exhibit at the New York World's Fair, 1939.

Steam Jet Air Ejectors

Obtain and Maintain High and Uniform Vacuum.
Save 400 to 600 Pounds Steam per Hour.
Reduce Maintenance Costs Practically to Zero.



Steam jet air ejectors of any size, type or combination designed, *manufactured* and installed.
Results in service show greater economy for steam jet air ejectors than for any other type of air removal equipment *manufactured*.
The economy of this equipment applied to steam turbines or to reciprocating engines previously equipped with independent or beam *connected* air pumps has been proven.
Surveys, recommendations, reports and estimates for furnishing and installing air ejectors will be made without cost or obligation by communicating with

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Gun Boring Large Shaft Sleeve

SHAFT SLEEVES CAN BE MOLDED — CAST — MACHINED — HYDROSTATICALLY TESTED AND SHIPPED WITHIN FORTY-EIGHT (48) HOURS

This is not unusual but is frequently specified by our customers for break-down jobs. Shenango-Penn is prepared and willing to meet your dry dock requirements and save you money in any emergency.

Brass, Bronzes and Monel Metal
H.T. Alloy Gray Irons — Ni-Resist
CASTINGS — SHAFT SLEEVES — BUSHINGS

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SHENANGO-PENN MOLD COMPANY
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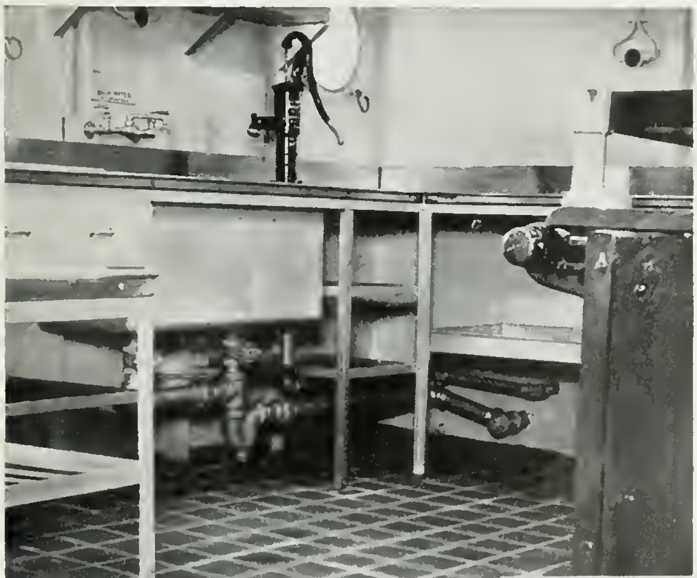
There's No Slipping Hazard in the Galley *on this Modern Tanker*



WHEN the "ESSO BOSTON" and several sister ships were built for the Standard Oil Company of New Jersey by the Federal Shipbuilding & Dry Dock Company, walking safety was assured in the galleys by Alundum Floor Tile. Spilled liquids cause no slipping hazard, for even when wet this tile gives a firm, sure footing. And it will never wear smooth and slippery in the spots where traffic is concentrated. Catalog A gives full information.

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NORTON FLOORS
Alundum Tiles, Treads & Aggregates

T-470

Building in American Yards

Pacific Coast

BETHLEHEM STEEL COMPANY, INC.

Shipbuilding Division
(Union Plant)
San Francisco

DRYDOCK AND ROUTINE REPAIRS: Mauna Kea, Maliko, Peter Lassen, F. H. Hillman, Washington, Portmar, U.S.H.B. General Frank M. Coxe, Curaca, Hagan, M.S. Port Costa, Captain A. F. Lucas, Virginian, Manulani, Vitus Bering, Charcas, President Pierce, Condor, Dirigo, Dredge Holland, Mariposa, Chipana, W. S. Rheem, San Clemente.

THE CAMPBELL MACHINE CO.

Foot of Eighth St.
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FELLOWS & STEWART, INC.

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42 commercial and pleasure boats for miscellaneous work.

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DRYDOCK AND ROUTINE REPAIRS: Gas. S. Golden State, Kewanee, Carfloat No. 3, Tug Kadiak, Solana, M.S. Alaska Standard, Tug Hercules, Barbara C., Ryder Hanify, Davenport.

HARBOR BOAT BUILDING CO.

Berth 264, Fish Harbor
Terminal Island, Calif.

NEW CONSTRUCTION: Two 40-foot high speed fishing cruisers. Completion date April 15, 1939.

DRYDOCK AND ROUTINE REPAIRS: Tuna boats Santa Marguerita and Magellan; Purse Seiners Costa Rica, Jackie Sue, City of San Pedro, Sea Rover, Star of San Pedro, Sea Breeze.

HONOLULU IRON WORKS

Honolulu, T. H.

DRYDOCK AND ROUTINE REPAIRS: M.S. Trade Wind, U.S.A.T. Grant.

LAKE WASHINGTON SHIPYARDS

Houghton, Wash.

NEW CONSTRUCTION: 200 foot steam geared turbine steel survey ship Explorer for U. S. Coast & Geodetic Survey. Estimated delivery date January 1, 1940.

Timber work on two caissons for Tacoma Narrows Bridge.

LOS ANGELES SHIPBUILDING & DRY DOCK CORP.

Los Angeles Harbor
San Pedro, Calif.

DRYDOCK AND ROUTINE REPAIRS: Josephine Lawrence, Barge Homer, M. V. Thorhild, Fishing Boat Tyoyo Maru No. 7, Arcata, Yacht Haida, La Brea, M. V. Velma.

MARE ISLAND NAVY YARD

Mare Island, Calif.

NEW CONSTRUCTION:

Swordfish, Submarine (SS193); keel laid October 27, 1937; estimated launching date April 1, 1939; estimated delivery date August 1, 1939.

Two harbor tugs, YT 133 and YT 134; keels laid September 29, 1938.

Garbage Lighter (YG 21); keel laid July 25, 1938.

Order received for construction of one submarine tender, Fulton (AS 11); dated June 30, 1938.

Order received for construction of one submarine, Tuna (SS203); dated June 30, 1938.

DRYDOCK AND ROUTINE REPAIRS: Chester, Vincennes, Case, Tucker, Shaw, Monaghan, Oriole, Turkey, Altair, Henderson, Partridge, Unadilla, Duane, Pickerel, Permit.

THE MOORE DRY DOCK CO.

Oakland, Calif.

NEW CONSTRUCTION:

Hulls Nos. 193 and 194, two lighthouse tenders for Bureau of Lighthouses; LOA 174′ 10½″, beam molded 32′, depth 14′ 6″. Twin screw triple expansion engines; water tube boiler; 1000 horsepower. One for Pacific Coast; one for Great Lakes. Keel for first ship laid December 5, 1938. Launching date March, 1939.

Hulls Nos. 195 and 196, two cargo vessels for U. S. Maritime Commission: LOA 492′ 0″, LBP 465′, breadth molded 69′ 6″, depth molded 42′ 6″, SHP normal 8500, SHP max. 9350, dis. 17,600 tons, deadweight 11,926 tons; steam turbine propelled.

DRYDOCK AND ROUTINE REPAIRS: Vancouver, Glacier, Clarement, Frances, Purse Seiners Little Flower and Western Traveler, Oliver Olson, J. A. Moffett, Iowan, Kentuckian, Velox, Alabaman, Barge Freese No. 2, Blue Water, Hawaiian Standard, Elizabeth, Carolinian, R. J. Hanna, Holystone, Lake Frances, W. D. Anderson, West Planter, Brookings, Silverbelle, Georgian, Astoria, El Commodore, H. T. Harper, Texas, Dakotan, Parinas, Montanan, Mexican, Charcas, Transit, Virginian, Point San Pablo, Nebraskan, W. H. Berg, Carolinian, Weser, Komuku, Columbine.

THE PUGET SOUND NAVY YARD

Bremerton, Washington

NEW CONSTRUCTION:

U.S.S. Wilson (Destroyer No. 408); standard displacement, 1500 tons; keel laid March 22, 1937.

U.S.S. Charles F. Hughes (Destroyer No. 428); standard displacement 1600 tons; order placed by Navy Department December 7, 1937. Keel laid January 3, 1939.

Ships authorized, work not started: Woban (YT138), harbor tug; Ala, (YT139), harbor tug; Barnegat (AVP10), seaplane tender; Biscayne (AVP11), seaplane tender; Monssen (DD436), destroyer.

DRYDOCK AND ROUTINE REPAIRS: Arizona, Nevada, Pyro, Saratoga.

TODD SEATTLE DRY DOCKS, INC.

Harbor Island
Seattle, Wash.

DRYDOCK AND ROUTINE REPAIRS: William Luckenbach, Point Ancha, Dredge Dan C. Kingman, Cordova, Mount McKinley, Makiki.

WESTERN BOAT BUILDING CO., INC.

2505 East 11th Street
Tacoma, Wash.

NEW CONSTRUCTION:

Hull No. 133, purse seine fishing boat 80′ x 20′ x 10′, powered by 200 H.P. Atlas engine, for stock. Launched December 1, 1938; completion date March 1, 1939.

Hull No. 134, tuna clipper 90′ x 24′ x 13′; 275 H.P. Union Diesel. Launching date February 15, 1939.

Hull No. 136, purse seine fishing boat 96′ x 22′, powered by 240 H.P. Atlas Diesel engine. Keel laid January 30, 1939; launching date March 1, 1939.

Atlantic, Lakes, Rivers

AMERICAN BRIDGE COMPANY

Pittsburgh, Pa.

NEW CONSTRUCTION:

Six standard coal barges 175′ x 26′ x 11′, for builder's account.

Help Labor to do more work with less effort.

CLARK CARLOADER

Here's a machine that will add to earnings. Reduces ship's time in port. Loads and unloads cargo in jig time—stows it snugly.

Write for booklet describing eleven different models.

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Battle Creek, Mich.

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ROBT. H. BRAUN, West Coast Mgr., Los Angeles

Only 38 in. wide, to thread narrow aisles. Low enough to maneuver in 'tween-deck space. Telescopic, to tier top-high.

EFFICIENCY AND OPERATING COSTS

Are largely dependent upon the quality of material in the wearing parts of the cylinders.

For increased engine efficiency, low fuel consumption and maintenance costs, apply liners, pistons and piston rings of HUNT-SPILLER AIR FURNACE GUN IRON.

Steam or Diesel—H. S. G. I. parts, either rough or finished, supplied for any type of engine.

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HUNT-SPILLER *Air Furnace* GUN IRON

Eleven coal barges with double steel bottom 195' x 35' x 11', for Central Barge Co., Chicago.

One relay barge 104' x 34' x 8' for the Panama Canal. Delivery date January 1, 1940.

BATH IRON WORKS

Bath, Maine

NEW CONSTRUCTION:

Hulls Nos. 170-171, DD409, Sims, and DD410, Hughes, two 1500-ton destroyers for U. S. Navy; contract date October 12, 1936; keels laid July 15 and September 15, 1937, respectively. **Launching date, DD409, April 8, 1939;** delivery dates, June and August, 1939, respectively.

Hulls Nos. 177 and 178, DD423 and DD424, two 1620-ton destroyers for U. S. Navy. Contract date September 30, 1937; delivery dates April and June, 1940, respectively.

Hulls Nos. 180-181, DD429 and DD430; two 1620 ton destroyers for U. S. Navy. Contract dated August 15, 1938; delivery in 28 and 30 months, respectively.

BETHLEHEM STEEL COMPANY, INC.

Shipbuilding Division

Fore River Yard

Quincy, Mass.

NEW CONSTRUCTION:

CV7, Wasp, Airplane Carrier for U. S. Government; keel laid April 1, 1936.

Hulls Nos. 1467, Panama; 1468, Ancon; and 1469, Cristobal; three passenger and freight steamers for Panama Railroad S.S. Co.; 486 feet x 64 feet x 38 feet 6 inches; 16½ knot speed. Keels laid, Nos. 1467 and 1468, October 25, 1937; No. 1469, November 15, 1937; **launching dates,** September 24, 1938, December 10, 1938, and **March 4, 1939.**

Hulls Nos. 1470 and 1471, two 1500-ton destroyers for U. S. Government; delivery dates March, 1940 and May, 1940.

Hulls Nos. 1474, 1475, 1476 and 1477, four freight vessels for American Export Lines, Inc.; 450' B.P. x 66' x 42'3"; 16½ knots; geared turbines and water tube boilers. Keel laid No. 1474, November 10, 1938; No. 1475, December, 1938.

Hull No. 1478, Massachusetts; 35,000 ton battleship for U. S. Navy.

BETHLEHEM STEEL COMPANY, INC.

Shipbuilding Division

Sparrows Point Yard

Sparrows Point, Md.

NEW CONSTRUCTION:

Hull No. 4334, L. P. St. Clair, 13,000 dwt. oil tanker for Union Oil Co. of Calif. Contract signed March, 1938. Launching date December 10, 1938; **delivered February 28, 1939.**

Hulls Nos. 4329, 4330, 4331; three 16,300 dwt. ton tankers for Standard Oil Co. of N. J.; 18 knots speed. Contract signed January 3, 1938.

Hulls Nos. 4332 and 4333; two 16,000 dwt. tankers for Socony Vacuum Oil Co. Contract signed February, 1938.

BETHLEHEM STEEL COMPANY, INC.

Shipbuilding Division

Staten Island Yard

Staten Island, N. Y.

NEW CONSTRUCTION:

Hulls Nos. 8001, Navajo; 8002, Seminole; and 8003, Cherokee—three U. S. Navy fleet tugs. No. 8001, keel laying date December 12, 1938; launching date September 15, 1939; delivery date January 25, 1940. No. 8002, keel laying date December 16, 1938; launching date November 15, 1939; delivery date March 25, 1940. No. 8003, keel laying date December 23, 1938; launching date January 15, 1940; delivery date May 25, 1940.

BOSTON NAVY YARD

Boston, Mass.

NEW CONSTRUCTION:

DD402, Mayrant, and DD403, Trippe, two light destroyers for United States Navy; LBP 334', beam 35'6" depth 19'8"; keels laid April 15, 1937; launched May 14, 1938; estimated delivery dates January, 1940, and February, 1940, respectively.

DD415, O'Brien, and DD416, Walke, two destroyers; LBP 341', beam 36', depth 19'8"; keels laid May 31, 1938; **launching date April, 1939;** delivery dates May, 1940, and July, 1940.

DD425, Madison, and DD426, Lansdale, two destroyers; 341'0" x 36'0" x 19'8". Keel laying date December 19, 1938; launching date April, 1940; delivery dates August and October, 1940.

DD433 and DD434, two destroyers, 341'0" x 36'0" x 19'8", contract awarded July 23, 1938. Keel laying date June, 1939; launching date April, 1940; completion dates June and August, 1941.

BROOKLYN NAVY YARD

Brooklyn, N. Y.

NEW CONSTRUCTION:

CL 50, Helena, light cruiser; L.B.P. 600' beam 61'7¾", standard displacement 10,000; geared turbine engines; express type boilers; keel laid December 9, 1936; launched August 27, 1938; estimated delivery January 2, 1940.

BB 55, North Carolina, battleship; L.B.P. 714' 0", beam to outside armor 108' 0", std. displ. 35,000 tons; geared turbine engines; express type boilers. Keel laid October 27, 1937; estimated launching date May 1, 1940; contract delivery September 1, 1941; estimated delivery date October 15, 1941.

CHARLESTON, S. C., NAVY YARD

Charleston, S. C.

NEW CONSTRUCTION:

One harbor tug, Massasoit (YT131); LOA 110', beam 24'; authorized August 12, 1937; keel laid July 25, 1938; launched December 13, 1938.

One harbor tug, Heekon (YT141); LOA 100', beam 25'; authorized July 7, 1938.

One harbor tug, Nokomis (YT142); LOA 100', beam 25'; authorized July 7, 1938.

Four destroyers.

DEFOE BOAT & MOTOR WORKS

Bay City, Mich.

NEW CONSTRUCTION:

Hulls Nos. 72 and 73; two diesel electric harbor cutters for Coast Guard; 110' x 26' 6"; powered by 1000 S.H.P. General Motors engines; steel construction. **Delivery date April, 1939.**

THE DRAVO CORPORATION

Engineering Works Division

Pittsburgh, Pa., and Wilmington, Del.

NEW CONSTRUCTION:

Hulls Nos. 1465, one welded cargo box barge 100' x 26' x 6' 6" for stock; 165 gross tons.

Hulls Nos. 1484-1489, six welded ash removal barges for Dept. of Sanitation, City of N. Y.; 150' x 37' x 12' 9"; 3318 gross tons.

Hull No. 1492, one welded steel coal barge 126' x 34' x 17' for stock; 673 gross tons.

Hulls Nos. 1503-1504, two welded steel oil barges 195' x 35' x 9' 6" for stock; 978 gross tons.

Hulls Nos. 1537-1538, two welded steel coal barges 175' x 26' x 10' 8" for stock; 944 gross tons.

Hulls Nos. 1539-1540, two welded 3 pocket dump scows 115' x 28' x 7' 6" for stock; 240 gross tons.

Hull No. 1543, one 25-ton floating crane for Navy Dept. Bureau of Yards & Docks; 335 gross tons.

Hulls Nos. 1544-1545, two welded steel hull 125 H.P. workboats for stock; 42 gross tons.

Hulls Nos. 1546-1555, ten welded steel coal barges 175' x 26' x 10' 8" for stock; 4720 gross tons.

Hulls Nos. 1556-1557, two welded steel oil barges 195' x 35 x 10' 6" for Canal Barge Co., New Orleans, La.; 1060 gross tons.

Hulls Nos. 1558-1561, four double bottom cargo barges 195' x 26' x 11' for stock; 2120 gross tons.

Hulls Nos. 1562-1567, six welded flush deck cargo box barges 100' x 26' x 6' 6" for stock; 990 gross tons.

ELECTRIC BOAT CORP.

Groton, Conn.

NEW CONSTRUCTION:

Hull No. 30, Saury (SS189); standard displacement 1450 tons; keel laid June 28, 1937; launching date August 20, 1938; **delivery date April, 1939.**

Hull No. 31, Spearfish (SS190); standard displacement 1450 tons; keel laying date September 9, 1937; launching date October 29, 1938; delivery date June, 1939.

Hull No. 33, Seadragon (SS194); 1450 tons; keel laying date April 18, 1938; delivery date December, 1939.

Hull No. 34, Sealion (SS195); 1450 tons; keel laying date June 20, 1938; delivery date February, 1940.

Hull No. 35, Tambor (SS198); standard displacement 1475 tons; keel laying date January 16, 1939; delivery date January, 1941.

Hull No. 36, Tautog (SS199); standard displacement 1475 tons; keel laying date March 2, 1939; delivery date March, 1941.

Hull No. 37, Thresher (SS200); standard

BIRD-ARCHER CO. of Calif., Inc.

BOILER WATER TREATMENT

Specialists in Marine Feed Water Problems

We have successfully treated and serviced the boilers of every new high pressure steamer built for Pacific Coast operation in recent years.

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PASSENGERS
AND
FREIGHT

The Largest and Fastest Freighters in the Intercoastal Trade

displacement 1475 tons; keel laying date May 15, 1939; delivery date May, 1941.

THE FEDERAL SHIPBUILDING AND DRY DOCK COMPANY

Kearny, N. J.

NEW CONSTRUCTION:

Two destroyers, DD398 Ellet and DD399 Lang, 1500 dis. tons; keels laid December 3, 1936, and April 5, 1937, respectively; launching dates June 11 and August 27, 1938, respectively. **DD398 delivered February 16, 1939.**

Two destroyers, DD411 Anderson and DD412 Hammann; keels laid November 15, 1937, and January 17, 1938, respectively; launching date February 4, 1939.

Hulls Nos. 151, 152 and 153, three tankers for Standard Oil Co. of New Jersey; keels laid, No. 151, July 1, 1938; No. 152, July 15, 1938. **No. 151 launching date March 4, 1939.**

Hulls Nos. 154-159, six C-2 cargo vessels for U. S. Maritime Commission. Keels laid, No. 154, August 25, 1938; No. 155, September 20, 1938; No. 156, January 3, 1939.

Hulls Nos. 160 and 161, two torpedo boat destroyers for the United States Navy. Keels laid March 1, 1939.

Hulls Nos. 162-167, six C-3 cargo vessels for U. S. Maritime Commission.

LEVINGSTON SHIPBUILDING CO.

Orange, Texas

NEW CONSTRUCTION:

One all welded oil barge 92′ x 27′ x 6′ for stock. **Delivered March, 1939.**

One all welded boiler barge 84′ x 28′ x 7′ for Sun Oil Company, Beaumont, Tex. **Delivered March, 1939.**

One all welded oil barge 173′ x 39′ x 8′ 6″ for Higman Towing Co., Orange, Tex. **Delivered March, 1939.**

One all welded tugboat 80′ LOA, 22′ beam molded, 9′ 6″ depth molded, for W. G. Coyle & Co., New Orleans, La. Powered with 550 H.P. Cooper-Bessemer diesel engine. **Delivered March, 1939.**

One all welded oil barge, 116′ x 30′ x 7′ for Clooney Construction & Towing Co., Lake Charles, La. **Delivered March, 1939.**

MANITOWOC SHIP BUILDING CO.

Manitowoc, Wis.

NEW CONSTRUCTION: **Six hopper barges** 158′ x 26′ x 10′, capacity 800 tons, for Marine Transit Co., Chicago, Ill. Delivery date spring, 1939.

One river towboat 100′ x 25′ x 8′, for Marine Transit Co., Chicago, Ill. Delivery date spring, 1939.

THE MARYLAND DRYDOCK CO.

A Subsidiary of Koppers Company,
Baltimore, Maryland

NEW CONSTRUCTION:

Hull No. 194, single screw steel derrick lighter for U. S. Engineer Office, N. Y. District. LOA 115′ 9⅜″, LBP 110′, beam overall 30′ 8¾″, beam molded 30′, depth molded 11′ 9″, frame spacing throughout 21″, load displacement 438 tons, mean load draft molded 9′ 2½″. Keel laying date October, 1938; launched December 29, 1938; **delivery date April 15, 1939.**

NEWPORT NEWS SHIPBUILDING & DRYDOCK CO.

90 Broad Street, New York

NEW CONSTRUCTION:

H362, light cruiser, CL49, St. Louis, keel laid December 10, 1936; launched April 15, 1938.

Hulls Nos. 363-364, two destroyers, Nos. 413, Mustin, and 414, Russell; keels laid December, 1937; launched December 8, 1938.

Hull No. 369, twin screw mail, passenger and cargo liner for United States Lines Co.; length 723′, beam 92′, depth 45′. Keel laid August 22, 1938.

Hulls Nos. 370, 371 and 372, three oil tankers for Standard Oil Company of New Jersey; gross tonnage about 11,500 tons; L.B.P. 525′, breadth molded 75′, depth molded 39′. Keel laid, No. 370, January 16, 1939.

Hulls Nos. 373, 374, 375 and 376, four single screw cargo vessels for United States Maritime Commission; turbine propulsion; gross tonnage about 9000 tons; length 435′, breadth 63′, depth 40′ 6″. Keels laid, No. 373, November 14, 1938; No. 374, November 28, 1938; No. 375, March 6, 1939.

Hull No. 378, battleship, 58, Indiana, for U. S. Navy.

Hulls Nos. 379, 380, 381, 382, 383 and 384, six single screw combination passenger and cargo vessels for U. S. Maritime Commission; length 465′, breadth 69′ 6″, depth 42′ 6″, gross tonnage about 8000 tons.

THE NEW YORK SHIPBUILDING CORPORATION

Camden, N. J.

NEW CONSTRUCTION:

One destroyer tender for U. S. Navy; order placed December 27, 1937.

One seaplane tender for U. S. Navy; order placed December 27, 1937.

One destroyer tender for U. S. Navy; order placed October 14, 1938.

One seaplane tender for U. S. Navy; order placed October 14, 1938.

One battleship for U. S. Navy; order placed December 1, 1938.

THE PUSEY & JONES CORP.

Wilmington, Del.

NEW CONSTRUCTION:

Hull No. 1070, one steel hopper dredge, Chester Harding; 2,500 cubic yard capacity; length overall 308′2″, length B.P. 300′0″, breadth molded 56′0″, depth molded 29′0″. Contract date February 14, 1938; keel laid May 15, 1938; launched January 20, 1939; delivery May 10, 1939.

Hull No. 1071, one steel lighthouse tender, Lilac Class, for Dept. of Commerce, Bureau of Lighthouses. Gross tonnage approximately 700 tons. Keel laid October 17, 1938; completion date July 5, 1939.

Two streamlined diesel tugs for Curtis Bay Towing Company; powered by 320 H.P. Enterprise engines; cost $200,000.

SUN SHIPBUILDING AND DRY DOCK COMPANY

Chester, Pa.

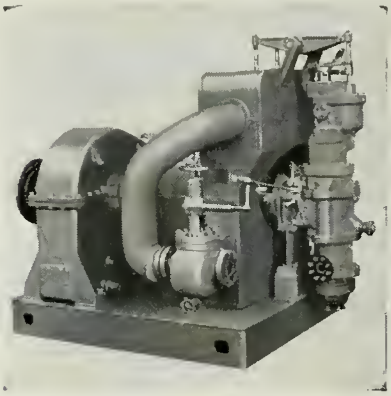
NEW CONSTRUCTION:

Hulls Nos. 173 and 174, two tankers for Standard Oil Co. of New Jersey; steam turbine; 525′ x 75′ x 39′; 16,300 dwt. Keel laying dates May 31 and July 14, 1938; **launching dates March 4 and April 22, 1939; delivery dates April 1 and May 15, 1939.**

Hulls Nos. 175-180, six single screw diesel cargo vessels, C-2 design, for U. S. Maritime Commission; equipped with Sun-Doxford engines. Keel laying dates July 25, 1938; July 26, 1938; August 27, 1938; August 28, 1938; January 14, 1939; March 6, 1939. Delivery dates July 4, 1939; September 2, 1939; November 1, 1939; December 31, 1939; March 1, 1940, and May 1, 1940.

Hull No. 181, single screw steam turbo electric drive tanker for Atlantic Refining Co.; 521′ x 70′ x 40′. Keel laid November 21, 1938; delivery date September 1, 1939.

Hulls Nos. 182, 183, 184 and 185, four single screw diesel cargo vessels for U. S. Maritime Commission, C-3 design. Equipped with Busch Sulzer engines. Delivery dates November 15, 1939; December 20, 1939; January 20, 1940, and February 20, 1940.



General Purpose Steam Turbines

Following extensive field experience in service, improved multistage steam turbines for general purpose drives are announced by Westinghouse Electric & Manufacturing Company. These improved turbines range from 100 to 2000 H.P., 100 to 5500 r.p.m., and are particularly suitable for driving pumps, fans, compressors, pulverizers and other machinery in process, brewing, central station, paper mill, petroleum, waterworks, marine and similar industries.

Modifications of one basic design provide for condensing, condensing extraction, non condensing, noncondensing extraction or mixed pressure service. The steam turbines known as Type "M" can be supplied for steam pressures up to 650 pounds, steam temperatures to 750° F., exhaust pressures to 200 pounds, vacuum to 29 inches of mercury, and extraction pressures to 200 pounds.

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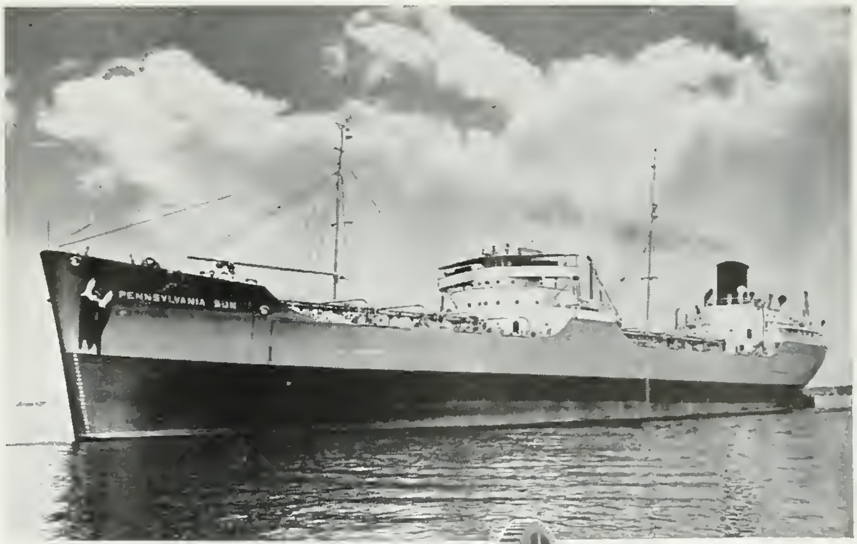
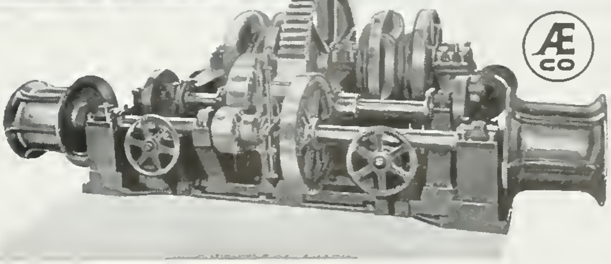
Ventilator Colors...Hull Finishes ...Copper Paints...Bottom Paints ...Boot-Topping

Into these synthetic finishes go the technical and scientific knowledge of the paint chemist and the latest, highest-quality synthetic pigments, gums and resins. Produced by W. P. Fuller & Co. . . . since 1849.

M. S.
Pennsylvania
Sun

M. S. Pennsylvania Sun, diesel tanker, designed and built by Sun Shipbuilding and Dry Dock Company for the Sun Oil Company. A-E-CO equipment: No. 12 opposed ram electro-hydraulic steering gear with hydraulic hand steering gear; No. 14 triple spur-geared steam windlass; three 8¼" x 10" compound geared winches; two 50 h. p. electric gypseys. Other recent ships built by Sun Ship, and A-E-CO equipped: MOBILOIL, MOBILGAS, WALLACE E. PRATT, ESSO BAYTOWN, W. H. BERG, H. D. COLLIER and ASSOCIATED. When it's A-E-CO it's dependable.





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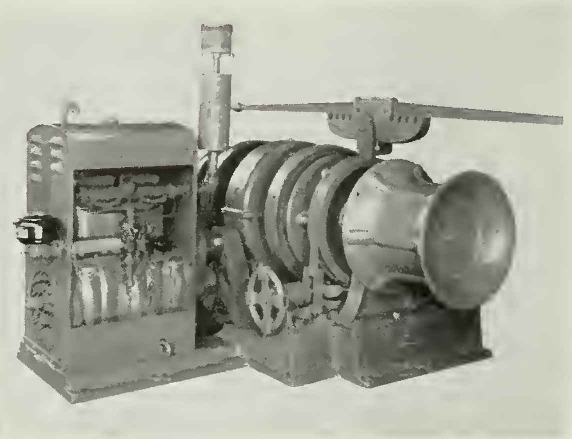
AMERICAN ENGINEERING COMPANY

2450 ARAMINGO AVENUE, PHILADELPHIA, PA.

NEW GASOLINE DRIVEN WINDLASS



Owners and operators of barges or other vessels which do not have sufficient available steam or electric power to operate a windlass yet which use anchors too heavy for hand operation by the crew will be interested in a new windlass developed by the American Engineering Company of Philadelphia.

This new windlass is gasoline driven by means of an air-cooled, twin cylinder engine rated at 12 H.P. Air cooling eliminates the care and maintenance of water cooling and makes the engine seaworthy under all weather conditions. The engine has a high tension magneto, flyball speed governor, clutch and power take-off. It is protected by a steel housing from the elements. The muffler has a flame arrester.

The windlass is a spur and worm geared type. All gears have machine cut teeth and are completely enclosed for protection to the operator and against the weather. The wildcats of the windlass will accommodate 7/8" to 1 1/8" chain. The windlass will handle anchors weighing from 750 to 1200 pounds at a chain speed of 24 ft. per minute. Hand pump brakes are included for emergency operation.

Short Wave Boat, Shore, Airplane Network

An interesting short wave radio telephone network for intercommunication has been delivered to the Glenn L. Martin Company, manufacturers of airplane and aircraft equipment at Baltimore, Maryland. The new system, which was built by the Western Electric Company, simultaneously links land, air, and water, while the giant Martin flying boats undergo development test flights.

The Martin plant, at Middle River, Md., is within a short distance of tide-water. A paved runway on company property leads from the Main Assembly Hall to a launching ramp on an inlet from the Chesapeake Bay where Martin flying ships take the water under ideal conditions for close supervision and observation. Dock facilities are provided on either side of the launching ramp. This strategic location provides an unusual opportunity for effective use of radio communication which has been capitalized in the following manner:

Intended primarily as a safety tool for establishing communication during such flights, the new system permits continuous contact between the aircraft under test, a service boat patroling the test area, Mr. Martin's yacht Glenmar, and telephone extensions in the manufacturing plant. Thus by means of the network the engineer in the plant can consult freely with observers aboard the hydroplane, and in addition both the pilot and the engineer can give and receive instructions from the surface craft.

A common frequency for use by all radio units in the system, in effect, puts them on a "party line" basis during tests, and additional frequencies in the marine radio telephone band will enable boats to contact the U. S. Coast Guard. In addition, the Glenmar is provided with complete facilities for communicating with telephones on shore through the Bell System coastal harbor radio telephone stations.

Standard Western Electric equipments are used throughout the system. Fifty-watt marine radio transmitters, equipped with voice-operated relays for automatically switching from "send" to "receive," are installed in the two vessels and at the plant. These units, in combination with their associated receivers, operate with the familiar telephone handset found in homes and offices. Standard aircraft equipment is also employed in the planes, but this apparatus has been converted for portable use so it may be shifted quickly from one plane to another as occasion demands.

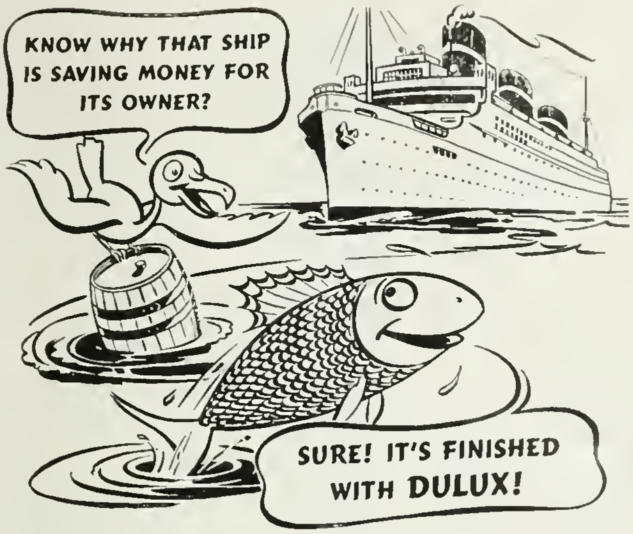
A New Lightweight Jack

The Rochester Machine Co. of Rochester, Pa., has developed a light-weight, compact, easy-to-handle hydraulic jack, having a 50-ton rated capacity, for use in locations too confined to admit a standard-size jack. Although this powerful little tool only weighs 46 lbs., it is especially valuable for use in steel mills and factories when repairing cranes, locomotives or other rolling stock, and in general for moving heavy machinery and other objects where the location of the point of application would be inaccessible to a larger jack of the same capacity.

The jack is made of steel throughout and has an overall height of 6" and a lift of 2 3/4". Minimum space required for lifting cylinder is 5" x 6 1/2" and maximum length 2' 8". The plunger is hardened to 1045 and the lifting cylinder is pack hardened.

To operate, simply place lifting cylinder under object and screw in long barrel until plunger contacts the object. Then turn long screw to lift object. To remove the jack, release long screw first, then the barrel and lifting plunger will return to original positions.

Descriptive literature will gladly be mailed on request.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SURE! IT'S FINISHED WITH DULUX!

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If you'd like complete information about this more durable, more economical finish, just write to: E. I. du Pont de Nemours & Co., Inc., 235 Second Street, San Francisco; 2419 South Grand Avenue, Los Angeles; 525 Boren Avenue, North, Seattle.

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WEST INDIES---SOUTH AMERICA

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Operating under the American flag.

SHIPPERS: The *Lurline* and *Matsonia* provide swift freight service to Hawaii. The *Mariposa* and *Monterey* continue to New Zealand and Australia via Samoa, Fiji. Modern refrigeration facilities on all four ships. Also frequent freighter service.

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S S LURLINE · S S MARIPOSA · S S MONTEREY · S S MATSONIA

AN EFFICIENT CARLOADER

An important development in freight and cargo handling equipment is a new loading and unloading machine for handling boxes, crates, bales, bundles, drums, carboys and all assembled unit loads that may be steel-strapped to skids of cleatboards that have as much as 2 inch underclearance.

This Clark Carloader is only 38 in. wide, has 38 in. wheel base, is 6 ft. long plus the steel fingers, pivots on one wheel, turns in less than its own length, carries its load at from 1 to 7 miles per hr., is built for 2,000, 3,000 and 3,500 lb. capacities, and in eleven models, some of them tiering to 9 ft. in 14 sec.

The driver sits comfortably on top of the machine, has full vision of his pick-up, operates the machine as he would his own car, is fully protected by the steel uprights of the hoisting mechanism. Gas power makes 24-hr. continuous operation possible and economical.

Results obtained by the use of this new mobile equipment convince shippers and carriers that cargo handling costs can be radically reduced. Its use multiplies man power eight or nine times; makes the work of each man easier. The Carloader is designed to work in with the modern practice of handling package cargo in unit pallet loads, and makes it possible to load stowage space top-high, pack freight cars to the roof, and multiply the storage capacity of dock area.

Clark Tructractor maintains Pacific Coast sales and service branches in Seattle, Portland, San Francisco and Los Angeles.

The Clark Carloader in action loading a boxcar.

A NEW VENTILATING DEVICE

The B. F. McDonald Company of Los Angeles and San Francisco has recently placed on the market a new ventilating device, known as the Air-Mover.

The new product is a light-weight, portable device for securing a positive, forced movement of large volumes of air either into or out of any area requiring rapid ventilation. Employing no moving parts or other mechanical means for effecting air displacement, the Air-Mover is ideally suited for ventilating working areas contaminated by smoke, fumes, dusts, or gases. It may also be used as a suction source to draw air from a confined space or as a delivery source to force fresh air to a working area.

This device operates on well-established principles of air expansion and air flow. Compressed air, at the available pressure, is fed to the instrument in which the air is expanded at high velocity through an annular orifice. The design of the device induces a powerful venturi effect, and a large volume of the atmosphere to be moved is drawn through the open bell of the Air-Mover and delivered with the expanded compressed air through the outlet horn.

Because of its lightness and portability, the Air-Mover is ideally suited for emergency ventilation. It can be quickly installed in confined places and obviates the possibility of explosive hazards through the absence of moving parts and driving motors.

Effective applications of the Air-Mover include: the removal of fumes from painting, welding, and torch cutting operations; forced ventilaton of contaminated atmospheres in storage tanks, bins, ship holds, manholes, or other confined and enclosed areas to maintain safe, comfortable working conditions; and the clearing of smoke from the interior of builidngs to facilitate firefighting and rescue operations. It also finds numerous applications underground

(Page 80, please)

B. F. McDonald

Marine and Industrial Equipment

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Rubber Mats for all Purposes.

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Steering Gears, Windlasses, Capstans, Bronze Propellers—as installed on America's finest ships.

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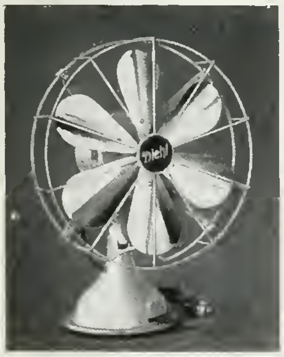

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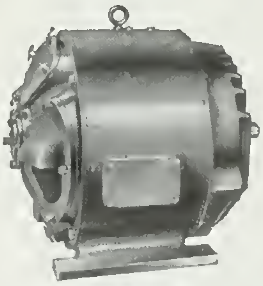

PROTECT YOUR MACHINERY with NUGENT FUEL and LUBE OIL FILTERS . . . . .

20 times more filtering area than most filters . . . close, evenly woven textile . . . removes solids as small as .0004" . . . Filtering medium easily removed and cleaned for reuse. ALL the oil in circulation is filtered every cycle.

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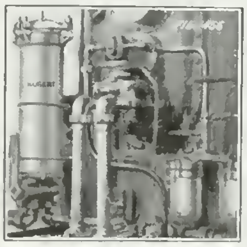
FILTERING AND OILING SYSTEMS



Marine Fire Line Globe and Angle Valves

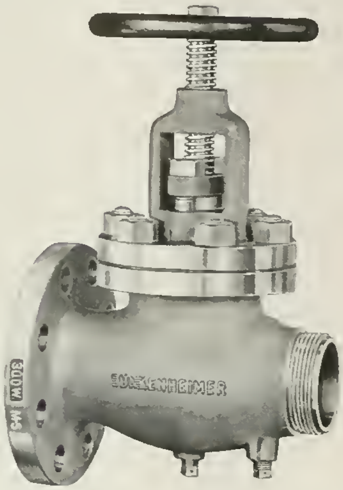
The Lunkenheimer Company, Cincinnati, has just placed on the market a new line of Marine Fire Line Globe and Angle Valves.

These valves comply with both the present Rules of the Bureau of Marine Inspection and Navigation and the proposed Rules of the Committee on Safety at Sea which apply to the construction of new ships under the jurisdiction of the Maritime Commission.

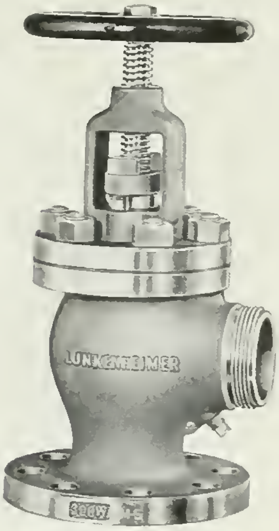
All valves have non-metallic disks and renewable seat rings. They are regularly made with National Standard hose threads on outlet, but are available with threads of any recognized standard.

They are available in globe and angle patterns with flanged inlet for 150 and 300 lb. W. P. and with screwed inlet for 300 lb. W. P.

Dimension drawings are available on request.



Globe Valve



Angle Valve

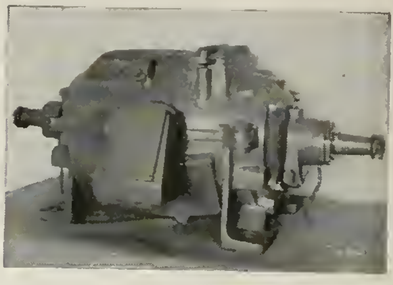
Marine Valve Bulletin: The Lunkenheimer Co. has just issued a 12-page attractively printed booklet entitled Bulletin M-1, "Lunkenheimer Valves for Marine Service."

In it are included abstracts of the requirements of existing marine regulations and a list of approved Lunkenheimer valves and accessories regularly made and tested in accordance with these requirements.

This bulletin is intended primarily as an aid to naval architects, shipbuilders, equipment manufacturers, dealers in marine supplies and operating engineers in selecting approved valves for use on shipboard. Copies are available through Lunkenheimer distributors or direct from the company in Cincinnati.

New C-O-Two Nozzle

New and improved C-O-Two Baffle type nozzles, providing a non-turbulent distribution of gas from C-O-Two carbon dioxide fire extinguishing systems have been developed by the C-O-Two Fire Equipment Company. These new nozzles reduce the velocity and pressure of the discharge and permit rapid expansion and non-violent penetration of the gas throughout the entire protected area. They are compact and do not require a protruding horn or metal enclosure which might become damaged or knocked off.



Direct Current Marine Motors

Marine motors designed especially for cargo winches, windlasses, capstans, boat hoists and similar applications requiring reliable, rugged, waterproof motors are announced by Westinghouse Electric & Manufacturing Company. These motors have heavy overload capacity and quick starting and stopping characteristics; are capable of withstanding extremes of temperature as well as the direct wash of heavy seas; and are, therefore, well suited for deck applications.

The frames are of cast steel and are split horizontally to provide easy access for inspection and repairs. They are equipped with one large opening directly over the commutator which is convenient for the inspection and adjustment of the brushes or brushholders. The armature coils are insulated on the slot portion with mica wrapper; field coils are vacuum impregnated with "Hydrolene Gum"; and a junction box for the entrance of conduit or leaded and armored cable through stuffing tubes is supplied at the split of the frame where the leads are brought out.

Ventilating Device

(Continued from Page 78)

in augmenting the normal air circulation to remote working rooms where mining operations may be carried on.

Copies of a new bulletin, describing and illustrating the remarkable performance of the Air-Mover, are available by addressing this magazine.

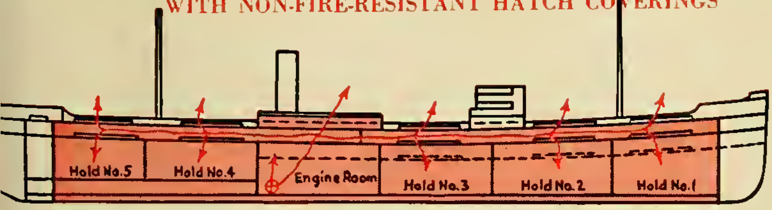
PACIFIC MARINE REVIEW

MAY, 1939

or Greater Safety at Sea —

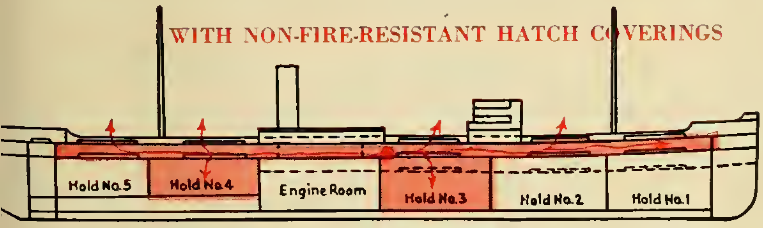
TOP FIRE FROM SPREADING!

WITH NON-FIRE-RESISTANT HATCH COVERINGS



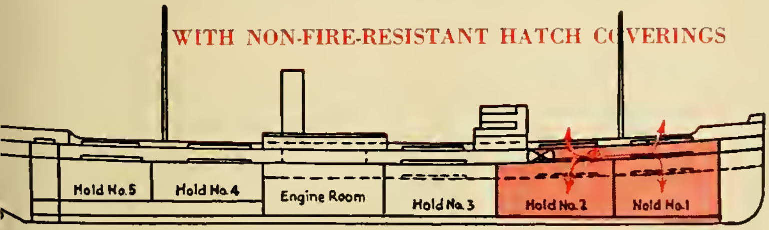
re originating in engineroom spreads forward and aft through shelter 'tween decks and attacks holds.*

WITH NON-FIRE-RESISTANT HATCH COVERINGS



park entering a ventilator starts fire in shelter 'tween decks, spreading to Nos. 3 and 4 holds.*

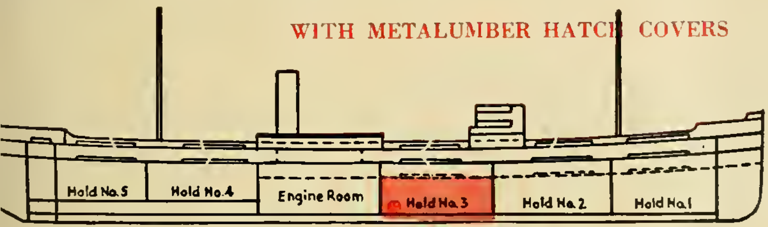
WITH NON-FIRE-RESISTANT HATCH COVERINGS



'rogress of fire starting in shelter deck space stopped by non-inflammable argo (X) completely filling out that space.* (But most cargo is combustible.)

erence: Transactions, Society of Naval Architects Marine Engineers, 1936, showing actual cases of ship and their spread to adjacent compartments.

WITH METALUMBER HATCH COVERS



'ire starting in cargo hold completely localized by Metalumber Hatchway Coverings to space in which it originated.

Install

METALUMBER Hatchway Coverings

Hatch covers represent 25 per cent of the average vessel's deck area. No vessel is more fireproof than her hatchway coverings. The wooden hatchboard presents a definite fire hazard, actually assisting fire to spread from one compartment to another.

METALUMBER is impervious to all those threats to safety and economy of operation occasioned by the use of wood in similar service.

METAL LUMBER CORPORATION
OF NEW JERSEY
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Another Metalumber safety feature — Ease of handling without mechanical aids reduces accidents to personnel.

Three Famous Trademarks

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EXTRA SUPERIOR MANILA
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COMPANY

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It is the *extra* protection that ropes bearing the Tubbs and Portland trademarks give that has made them first choice of ship operators of the Pacific.

Whether in port or at sea, you can always rely on these famous Marine brands to render dependable service under the most exacting conditions.

Made with extra strength to assure an extra factor of safety, Tubbs and Portland Marine rope are also longer lasting, more water resistant, easier to handle.

Specify the Tubbs and Portland trademarks in every port of the Pacific where Marine rope is sold.

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PORTLAND CORDAGE CO.

PORTLAND NEW YORK SEATTLE

PACIFIC MARINE REVIEW

MAY, 1939

Official Organ

Pacific American Steamship Association

Shipowners Association of the Pacific Coast

TABLE OF CONTENTS

Editorial Comment:
New Ships for Pacific Routes ... 23

Your Problems Answered ... 28
By "The Chief."

Steady as You Go! ... 30
Air-Borne Damage to Sea-Borne Cargoes.
VI Ventilation of Holds.
By Oliver D. Colvin, Werner H. E. Hahne and Mark R. Colby.

Three New Passenger Liners for the Panama Railroad Steamship Co. ... 32

Delta Line Combination Liners ... 39

Globe Wireless Marine Transmitter ... 40

Two New Ice-Breaking Harbor Cutters ... 42

Save the Gjoa ... 45

Metalumber Safety Hatch Covers ... 46

Priming Equipment for Submerged Suction Centrifugal Pumps ... 50

On the Ways ... 52
Latest News from American Shipyards.

Safety—A Top Executive Function ... 54
By S. I. Cooper.

Building in American Yards ... 60

Miscellaneous: Trade Literature and Trade Notes, 44; Mechanical Ferrets for Cleaning Pipes, 48; New Portable X-Ray Flaw Detector, 48; Universal Pitchometer, 48; New Duplex Welding Hose, 48; Dex-O-Trex, 49; Electric Couplings for Diesel Ships, 64.

PUBLISHED AT 500 SANSOME STREET . . . . SAN FRANCISCO

Entered as second class matter June 20, 1913, at the post office, San Francisco, under the Act of March 3, 1879. Published on the 1st of each month. Advertising and editorial forms close on the 15th. Subscription price, one year: Domestic, $1.50; foreign, $2.50; two years: Domestic, $2.50; foreign, $4.00; three years: Domestic, $3.00; foreign, $5.50; single copies, 25c. Chas. F. A. Mann, Northwest Representative, 1110 Puget Sound Bank Bldg., Tacoma, Washington. New York Office, Suite 404-405-406, Two Hundred Broadway, Telephone COrdlandt 7-3579.

In New York City copies of Pacific Marine Review can be purchased at the news stands of I. Goldberg, 42 Broadway; Harry Nash, 17 Battery Place; Philip Mandara, Greenwich Street and Battery Place. In Washington, D. C., at the news stand of the Carlton Hotel, 16th and K Streets.

J. S. Hines	B. N. DeRochie	Alexander J. Dickie	Paul Faulkner	F. Dryden Moore
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A rubber Latex product suitable for finished decking, bulkhead surfacing, hull coating and underlay which is widely known and used in European yards.

Dex-O-Tex has been used on the six American President Line ships, S.S. President Adams, S.S. President Cleveland, S.S. President Polk, S.S. President Harrison and the S.S. President Garfield—as finished weather decking; for boat deck, poop deck, pilot house and area surrounding refrigerator hatches. As underlay and adhesive for ceramic tiling on swimming pools and bathrooms for S.S. Brazil and S.S. Argentina. Installed on weatherdecks of Matson Line's S.S. Maui and S.S. Manoa. These are only a few of the applications of Dex-O-Tex.

- it saves weight, average weight is 2.8 lbs. per square foot, ⅜ inches thick.
- it is applied cold and it is waterproof.
- it is resilient and will not crack with the working of the ship.
- it has valuable sound-deadening and insulating properties.
- it has perfect adhesion to the deck plates, obviating the use of anchors.
- it is definitely anti-corrosive.
- fire resistant.

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CHAPTER XVIII ON AMERICAN COMMERCE

PETROLEUM

A YOUNG surveyor by the name of George Washington first discovered oil floating on the surface of a creek in western Pennsylvania, found that the Indians used it only as medicine, was surprised to find that it burned, then answered the Colonies' call and never returned.

(c) Arnold

As the Nation grew, more places were discovered where petroleum oozed from the ground. Kerosene supplanted coal oil in lamps, and self-titled Colonel Drake was commissioned to try to drill for oil. After long discouragement, in 1859 came the cry "Oil!", heard 'round the world. Farmers became wealthy over night. Spotted over the nation oil derricks rose to the sky. The lamps of the world were dependent on kerosene. Then a man by the name of Thomas Edison invented a gadget called the electric bulb; kerosene lamps were blown out forever; petroleum was apparently through.

But destiny had other plans. In time the internal combustion engine and, later, the automobile came chugging into the scene. Today the United States produces two-thirds of the world's petroleum, giving us not only gasoline but hundreds of other products which we all know. There are more than 350,000 oil wells in 22 states, some of these going more than 2 miles below the surface. Our machine age is dependent on petroleum, and thousands visit a monument in Titusville erected to the memory of old Colonel Drake.

The McCormick Steamship Company transports petroleum products between the Atlantic and the Pacific, between Pacific Coast Ports, and to the East Coast of South America. We are specially equipped to handle your products too, bulk or packaged, with care and dispatch.

4 ROUTES

McCORMICK STEAMSHIP COMPANY

461 MARKET ST., SAN FRANCISCO DOuglas 2561

PACIFIC MARINE REVIEW

VOLUME XXXVI MAY, 1939 NUMBER 5

New Ships for Pacific Ocean Routes

At the present time there are under construction or definitely planned for Pacific Ocean American-flag operation and ownership approximately $130,000,000 worth of new vessels.

San Francisco, but recently mourning the loss of three luxury liners, seems destined in the near future to be the home port for five larger, faster and more luxurious liners. We refer to the three vessels intended to run as mates with the President Coolidge in the American President Lines' transpacific service, and to the two proposed Matson ships for their Oceanic services to Australia and New Zealand.

These five vessels are to be the largest and fastest merchant ships under the American flag. They will be built at a total cost approximating $85,000,000.

The Maritime Commission will be ready in a few months to call for bids on the American President Line ships, and the go ahead signal from Matson awaits favorable action on special subsidies, which is now practically assured.

Added to these are several programs for smaller ships, the most important of which is the program now under construction at Newport News for six C-3 combination cargo and passenger vessels for the round-the-world service of the American President Lines. This program approximates $18,000,000.

The McCormick Steamship Company are figuring four vessels in the immediate future, to cost approximately $8,000,000.

A Pacific Coast oil company is reported to have ordered another 13,000-ton tanker from an Atlantic Coast shipyard, to cost approximately $2,000,000.

Six C-2 standard cargo vessels with passenger accommodation for 12 persons are figured by the Maritime Commission to be the present program for a Puget Sound-Orient transpacific line. These are under construction at a cost of $15,000,000.

This huge program is a positive indication: of the virility of Pacific American shipping; of the fact that the Pacific Coast is a strong market for marine equipment and supplies; of the reason that the shipowners of the Pacific Coast are opposed to the transfer to the U. S. Navy of the great Hunter's Point drydock in San Francisco Bay; and of the importance of the Pacific Ocean trade routes to the United States' position in world commerce.

It is indicative also of the necessity of building up a stronger position for the Pacific Coast ship repair and shipbuilding industry.

THE U. S. MARITIME COMMISSION

An Appreciation of its Work on its Second Anniversary

In our issue for May, 1937, we recorded the welcome news that the President had completed and the Senate had confirmed the selection of five men to form the U. S. Maritime Commission. These five men were:

Joseph P. Kennedy, Chairman (2-year term).

Rear Admiral Emory S. Land (6-year term).

Edward Carleton Moran, Jr., (5-year term).

Rear Admiral Henry A. Wiley (4-year term).

Thomas M. Woodward (3-year term).

(All terms dating from March 9, 1937.)

As we then declared: "Individually and collectively under the restrictions of choice imposed by the enabling act, this Commission is a good representative cross section of the American public. Sectionally it represents only that small portion of this country lying north and east of Washington, D. C."

This Commission, under the dynamic leadership of Joseph P. Kennedy, made a thorough and intensive survey of the American overseas merchant marine. As a result of this survey it was determined that:

(1) Certain subsidies should be cancelled;

(2) Certain subsidized lines should be consolidated;

(3) On or before a certain date all former postal contract lines should be either off subsidy or established equitably on the new direct subsidy basis;

(4) And that a minimum requirement for the replacement of the foreign trading fleet and for the naval necessities of the United States would be 500 vessels, to be built at the rate of 50 per year for 10 years. On this item Congress agreed, authorized the Commission to proceed on the basis of 250 ships in five years, and appropriated the funds ($250,000,000) thought necessary for the Commission's share in this construction. The first two objectives were promptly attained, and Joseph P. Kennedy was made ambassador to Great Britain.

Rear Admiral Emory S. Land was promoted to chairman of the Commission, and Max O'Rell Truitt was appointed to fill the vacancy.

In the meantime the Commission was completing its own organization at Washington and at its offices in the principal port cities, and its technical division was busy designing hulls and machinery layouts for the new ships to be built to complete its 10-year program.

Progress made to date on plans and specifications completed is best shown in Table I herewith, which lists only the completed and released designs. In addition to this the Technical Division of the Commission has practically completed designs for the new transpacific liners for the American President Lines, and has under survey a number of ship designs offered by applicants for shipbuilding subsidies.

To date ships have been ordered by the Maritime Commission from the various shipyards and on the dates as indicated in Table II.

These 66 ships under construction are a very tangible, easily understood measure of results in the concrete, and show very good progress.

TABLE I

TYPES DESIGNED OR APPROVED BY THE U. S. MARITIME COMMISSION	Atlantic Passenger Liner	C-3 Cargo and Passenger Liner	C-2 Cargo Vessel	C-1 Cargo Vessel	Export Line Ship	Mississippi S. S. Co. Ship	Naval Features Tankers
Length, O. A., feet	723′	492′	459′	390′	475′ 1″	492′	533′
Length, B.P., feet	689′	465′	435′	......	450′	......	525′
Beam Molded, feet	92′	69′ 6″	63′	58′	66′	65′ 6″	75′
Depth Molded, feet	45′	42′ 6″	40′ 6″	......	42′ 3″	......	......
Draft Loaded, feet	32′	26′ 6″	25′ 9″	24′	27′	25′ 6″	31′ 7¾″
Gross Tonnage	......	8,000	......	......	......	8,300	......
Net Tonnage	......	4,770	......	......	......	......	......
Displacement, tons	34,370	16,190	13,900	......	......	14,200	......
Total D.W.C., tons	12,400	9,690	9,200	7,500	......	8,900	18,330
Cargo D.W., tons	......	7,380	7,618	......	8,775	......	14
Cargo, Cubic, M. cu. ft.	370	514	540	450	534	......	......
Passengers, 1st Class	577	97	......	......	12	63	......
Passengers, 2nd Class	409	......	......	......	......	......	......
Passengers, 3rd Class	233	......	......	......	......	......	......
Crew	639	119	......	......	......	95	69
Propellers, Number	2	1	1	1	1	1	2
Propeller Speed, R.P.M.	128	85	92	......	96	......	96
Shaft Horsepower	34,000	8,500	6,000	4,000	8,000	8,500	13,500
Elect. Capacity, K.W.	2,400	600	400	......	......	900	800
Steam Pressure, lbs.	425	450	450	450	425	450	450
Steam Temperature, °F.	700	750	750	750	740	750	750
Sea Speed, knots	22	16.5	15.5	15	16.5	16.5	18
Cruising Radius, miles	10,000	12,000	......	......	15,000	......	10,000

NOTES: —The standard C-3 cargo steamer differs from the C-3 cargo and passenger liner in having greater total and cargo deadweight and no passenger accommodations.

Final plans for the C-1 design are not yet issued.

REPORT NO. 1

U. S. MARITIME COMMISSION
TECHNICAL DIVISION
WASHINGTON, D. C.

DATE April 1, 1

VESSELS UNDER CONSTRUCTION

REPORT OF PROGRESS AS OF MARCH 31, 19

Type	Propulsion	Commission's		Builder's Hull No.	Name	Operator	Builder	Percentage of Completion		Keel Laid	Launched	Date of Contract	Months to Build	Date of Completion	
		Cont. No.	Hull No.					Total	Gain for Month Total					As per Contract	As Reported By Building Yard
Pass.	Turbine	MC-59	MC-1	369	America	U. S. Lines	Newport News SB & DD Co.	30.50%	3.16%	8/22/38		10/21/37	28	2/20/40	
Tanker	"	MC-75	MC-3	173	Seakay	Standard Oil Co. of N.J.	Sun SB & DD Co.	Completed and Delivered to Standard Oil Co. March 23, 1939							
"	"	MC-76	MC-4	174	Esso New Orleans	" " "	" " " "	95.0	17.0	7/10/38		1/ 3/38	17½	6/15/39	4/31/39
"	"	MC-77	MC-5	151	Markay	" " "	Federal SB & DD Co.	91.0	13.0	6/ 3/38	3/ 4/39	1/ 3/38	22½	11/15/39	6/ 1/39
"	"	MC-78	MC-6	152	Neosho	" " "	" " " "	74.0	7.0	6/22/38		1/ 3/38	24	1/ 2/40	8/ 1/39
"	"	MC-79	MC-7	153	Esso Trenton	" " "	" " " "	20.0	5.0			1/ 3/38	36	1/ 2/41	3/28/40
"	"	MC-80	MC-8	4329	Esso Annapolis	" " "	Bethlehem Steel Co. Shipbuilding Div. Sparrows Point, Md.	48.0	8.0	9/14/38		1/ 3/38	21	10/ 1/39	10/ 1/39
"	"	MC-81	MC-9	4330	Esso Albany	" " "	" " "	40.0	12.0	12/20/38		1/ 3/38	27	4/ 1/40	
"	"	MC-82	MC-10	4331	Esso Augusta	" " "	" " "	5.0	5.0			1/ 3/38	36	1/ 1/41	
"	"	MC-83	MC-11	370	Esso Richmond	" " "	Newport News SB & DD Co.	31.0	9.0	1/16/39		1/ 3/38	26½	3/15/40	
"	"	MC-84	MC-12	371	Esso Raleigh	" " "	" " "	12.0	0.0			1/ 3/38	27½	4/15/40	
"	"	MC-85	MC-13	372	Esso Columbia	" " "	" " "	12.0	0.0			1/ 3/38	38½	3/15/41	
													Days		
C2-Cargo	"	MCc-25	MC-14	154	Challenge		Federal SB & DD Co.	60.2	8.0	8/25/38		5/ 9/38	420	7/ 3/39	7/ 3/39
"	"	MCc-26	MC-15	155	Comet		" " " "	56.5	7.5	9/20/38		5/ 9/38	480	9/ 1/39	9/ 1/39
"	"	MCc-27	MC-16	156	Lightning		" " " "	41.8	7.5	1/ 3/39		5/ 9/38	540	10/31/39	10/31/39
"	"	MCc-28	MC-17	157	Flying Cloud		" " " "	36.5	6.75	3/16/39		5/ 9/38	600	12/30/39	12/30/39
"	Diesel	MCc-29	MC-18	175	Donald McKay		Sun SB & DD Co.	79.5	14.5	7/25/38		5/10/38	420	7/ 4/39	5/15/39
"	"	MCc-30	MC-19	176	Meteor		" " " "	67.5	18.5	7/26/38		5/10/38	499	9/21/39	6/15/39
"	"	MCc-31	MC-20	177	Northern Light		" " " "	46.5	10.7	8/10/38		5/10/38	540	11/ 1/39	7/15/39
"	"	MCc-32	MC-21	178	Rainbow		" " " "	36.2	3.0	8/15/38		5/10/38	600	12/31/39	8/15/39
"	"	MCc-19	MC-22	33	Sea Witch		Tampa SB & Engr. Co.	19.5	2.0	9/21/38		5/21/38	522	10/25/39	
"	"	MCc-20	MC-23	34	Shooting Star		" " " "	19.5	2.0	9/24/38		5/21/38	581	12/23/39	
"	"	MCc-21	MC-24	35	Surprise		" " " "	0.9	0.2			5/21/38	642	2/22/40	
C2-Cargo	Diesel	MCc-22	MC-25	36	Sweepstakes		Tampa SB & Engr. Co.	0.9	0.2			5/21/38	701	4/21/40	
"	Turbine	MCc-40	MC-26	373	Nightingale		Newport News SB & DD Co.	55.2	16.2	11/14/38		6/ 7/38	420	8/ 2/39	8/ 2/39
"	"	MCc-41	MC-27	374	Stag Hound		" " "	41.75	6.75	11/28/38		6/ 7/38	480	10/ 1/39	9/29/39
"	"	MCc-42	MC-28	375			" " "	33.25	6.5			6/ 7/38	540	11/30/39	3/ 1/40
"	"	MCc-43	MC-29	376			" " "	28.75	3.75			6/ 7/38	600	1/29/40	4/ 1/40
"	Diesel	MCc-51	MC-30	179	Raven		Sun SB & DD Co.	32.0	3.0	1/12/39		6/21/38	618	3/ 1/40	9/15/39
"	"	MCc-52	MC-31	180	Sea Serpent		" " " "	28.0	7.7	3/ 9/39		6/21/38	678	5/ 1/40	10/15/39
"	Turbine	MCc-53	MC-32	158	Flying Fish		Federal SB & DD Co.	27.0	1.0			6/21/38	617	2/29/40	2/29/40
"	"	MCc-54	MC-33	159	Hornet		" " " "	27.0	1.0			6/21/38	677	4/29/40	4/29/40
Cargo	"	MCc-91	MC-34	1474		Am. Ex-Lines Inc.	Bethlehem Steel Co. Shipbuilding Div.	27.0	3.8	11/ 7/38		8/11/38	450	11/ 5/39	11/ 5/39
"	"	MCc-92	MC-35	1475		" "	Fore River Plant	25.2	3.5	12/16/38		8/11/38	480	12/ 5/39	12/ 5/39
"	"	MCc-93	MC-36	1476		" "	Quincy, Mass.	18.2	2.5			8/11/38	660	6/ 2/40	6/ 2/40
"	"	MCc-94	MC-37	1477		" "		16.0	1.8			8/11/38	720	8/ 1/40	8/ 1/40
School Ship	"	MCc-133	MCR-4		American Seaman ex - SS Edgemoor "Conversion"		Bethlehem Steel Co. Baltimore, Md. Shipbuilding Div.	90.0	17.0			9/14/38	160	3/ 1/39	4/18/39
C3-Cargo	"	MCc-160	MC-38	162			Federal SB & DD Co.	8.0	1.5			11/28/38	450	2/21/40	2/21/40
"	"	MCc-161	MC-39	163			" " " "	8.0	1.5			11/28/38	510	4/21/40	4/21/40
"	"	MCc-162	MC-40	164			" " " "	3.5	0.75			11/28/38	570	6/20/40	6/20/40
"	"	MCc-163	MC-41	165			" " " "	3.5	0.75			11/28/38	630	8/19/40	8/19/40
"	"	MCc-164	MC-42	166			" " " "	3.25	0.5			11/28/38	690	10/18/40	10/18/40
"	"	MCc-165	MC-43	167			" " " "	2.5	0.5			11/28/38	750	12/17/40	12/17/40
"	Diesel	MCc-166	MC-44	182			Sun SB & DD Co.	1.5	0.5			12/ 8/38	440	2/21/40	11/15/39
"	"	MCc-167	MC-45	183			" " " "	1.5	0.5			12/ 8/38	500	4/21/40	12/20/39
"	"	MCc-168	MC-46	184			" " " "	1.5	0.5			12/ 8/38	560	6/20/40	1/20/40
"	"	MCc-169	MC-47	185			" " " "	1.5	0.5			12/ 8/38	620	8/19/40	2/20/40
Pass. & Cargo	Turbine	MCc-173	MC-48	4337		Miss. Shipping Co.Inc.	Bethlehem Steel	3.3	2.8			12/21/38	450	3/15/40	
	"	MCc-174	MC-49	4338			Co. Shipbuilding	2.5	2.0			12/21/38	510	5/14/40	
"	"	MCc-175	MC-50	4339		"	Div. Sparrows Point, Md.	1.0	0.5			12/21/38	871	5/10/41	
C3-Cargo	"	MCc-197	MC-51	195			Moore Drydock Co.	6.0	5.8	3/18/39		1/25/39	491	5/30/40	
"	"	MCc-198	MC-52	196			Oakland, Cal.	4.0	3.8			1/25/39	551	7/29/40	
C3-Cargo & Pass.	"	MCc-200	MC-53	379			Newport News SB & DD Co.	0.5	0.3			2/ 6/39	548	8/ 7/40	
"	"	MCc-201	MC-54	380			" " "	0.5	0.3			2/ 6/39	608	10/ 6/40	
"	"	MCc-202	MC-55	381			" " "	0.5	0.3			2/ 6/39	668	12/ 5/40	
"	"	MCc-203	MC-56	382			" " "	0.5	0.3			2/ 6/39	728	2/ 3/41	
"	"	MCc-204	MC-57	383			" " "	0.5	0.3			2/ 6/39	888	4/ 4/41	
"	"	MCc-205	MC-58	384			" " "	0.5	0.3			2/ 6/39	948	6/ 3/41	
C3-Cargo & Pass.	Diesel	MCc-206	MC-59	186			Sun SB & DD Co.	0.0	0.0			2/15/39	599	10/ 6/40	
"	"	MCc-207	MC-60	187			" " " "	0.0	0.0			2/15/39	659	12/ 5/40	
"	"	MCc-208	MC-61	188			" " " "	0.0	0.0			2/15/39	719	2/ 3/41	
"	"	MCc-209	MC-62	189			" " " "	0.0	0.0			2/15/39	779	4/ 4/41	
C3-Cargo	Turbine	MCc-210	MC-63	253			Ingalls Shipbuilding	0.0	0.0			3/15/39	600	11/ 4/40	
"	"	MCc-211	MC-64	254			Corp., Pascagoula,	0.0	0.0			3/15/39	660	1/ 3/41	
"	"	MCc-212	MC-65	255			Miss.	0.0	0.0			3/15/39	720	3/ 4/41	
"	"	MCc-213	MC-66	256				0.0	0.0			3/15/39	720	5/ 3/41	

Table II. Sixty-six ships ordered. Two ships completed and delivered. Fifty-eight ships for Atlantic Coast, 6 for Gulf Coast, 2 for Pacific Coast Shipbuilders.

The C-3 design is one that is readily adaptable to the needs of the modern ship operator on many of the world's trade routes. From observation of the trials of similar vessels, we look to see this model exceed its speed requirements and show an economy somewhat better than that specified.

While it is true that this shipbuilding program of the Maritime Commission has now brought American shipbuilding to its most active peace-time level, it is also true that this program must be considerably accelerated if the proposed 500 vessels are to be completed within the ten-year period.

S.S. Seakay, one of the 12 naval defense features tankers.

Of the sixty-six vessels, 17 are scheduled for delivery in 1939; 30 are to be finished in 1940; and 19 will be completed in 1941.

If we take the date January 1, 1938, as the beginning of the five-year period, then it is very evident that there should be under construction by the end of 1939 at least 125 vessels, and that the rate of orders and construction must be speeded up considerably if we are to have 250 new vessels by the end of 1943.

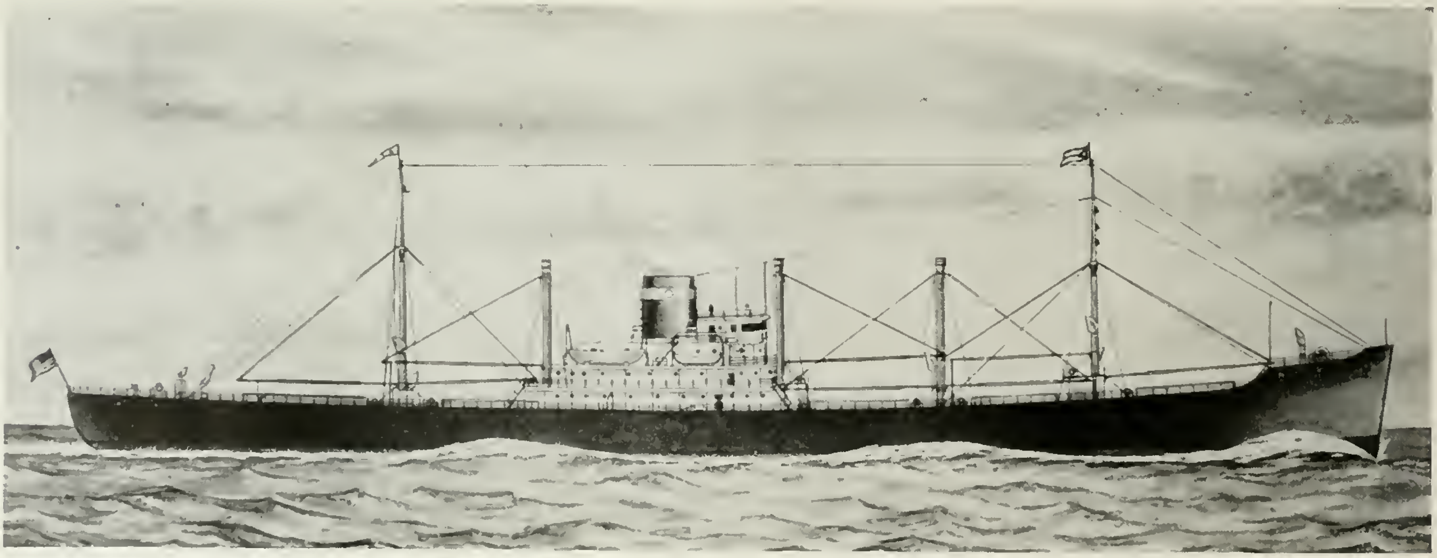
Other divisions of the Maritime Commission are likewise making good records in clearing up matters entrusted to their care. The regulatory functions of the Commission require that it should sit in judgment on many disputes between various maritime carriers and between those carriers and their shippers. Rates, handling practices, paper practique, conferences and many other factors in ship and port operation are constantly in dispute and as constantly referred to the Commission for hearings and settlement.

Transfer of vessel registry and sales of vessels to aliens are subject to the approval of the Commission.

There is much litigation by and against the Maritime Commission. 291 cases and 60 claims were inherited from the Shipping Board. Many of these were promptly closed. Admiralty legislation is a long-drawn-out process and today there are still many cases on the docket.

Perhaps the most vital, and certainly one of the most interesting, activities of the Maritime Commission is the educational institution initiated and financed by the Commission and operated by the U. S. Coast Guard. Between August, 1938, and March, 1939, some 4500 applications for enrollment were received. Of these 2584 were accepted for enrollment as rapidly as facilities permit. From those accepted, 861 have already been in training, including 196 licensed officers; and of unlicensed personnel, 256 from the deck, 276 from the engine, and 133 from the steward's department.

In the research department of the Commission many experts are making careful analysis of records to discover the true facts on such essential matters as: the relative costs of ship construction in the various shipbuilding countries; the various sub-



Artist's conception of C-3 Standard Cargo Vessel as designed by U. S. Maritime Commission.

sidy methods employed by the governments of ship operating countries; the relative costs of ship operation under various flags; the possibilities of opening new trade routes; and the effect of American flag ship operation in building up American trade.

The second anniversary of the birth of the U. S. Maritime Commission finds that husky infant undertaking with hearty energy and smooth efficiency a man-sized piece of work that involves good jobs for thousands of American workmen and will result in many faster and finer American ships manned by better and more efficient American seamen. This work and its results will increase and spread until the United States is represented on all the oceans by a fleet of modern, fast, economical passenger and cargo carriers sufficient to take care of her share of the world's international commerce.

Shipowners Oppose Naval Ownership of Hunter's Point Dock

Realizing the value of Hunter's Point drydocks to the commercial shipping entering San Francisco Bay, the Pacific American Steamship Association has placed itself on record as being opposed to U. S. Navy ownership of this great commercial facility. There are a number of the larger liners, such as the President Coolidge of the American President Lines, Mariposa, Monterey, Lurline and Matsonia of the Matson fleet, and other ships that have their home port in San Francisco and that depend on Hunter's Point drydocks as the only facility on the Bay that will safely and easily dock them for regular cleaning and painting or for any emergency overhaul.

Hunter's Point has often been a haven of refuge for smaller vessels in distress and twice last year the availability of this great dock was the only thing that stood between a vessel and sinking after collision. With these circumstances in mind the Pacific American Steamship Association on April 11 unanimously endorsed the following resolution:

WHEREAS, Legislative bills now pending in Congress propose acquisition and construction of graving drydocks and repair shop facilities by the Federal Government at San Francisco and Los Angeles harbors to be of size sufficient to accommodate the largest ships of the Navy; and

WHEREAS, existing privately owned drydock plants would, if assured of long term docking of naval vessels at these plants, be prepared to expend a considerable sum to have Hunter's Point drydock equipped with the facilities to meet the Navy Department's requirements;

NOW, THEREFORE, BE IT RESOLVED, that the Pacific American Steamship Association records its opposition to the Government's proposal to acquire and construct these graving drydock and repair shop facilities for the following reasons:

(1) Oppose Government entering into competition with private industry;

(2) That the general shipping interests and other interests of the port of San Francisco would be better served by having the graving dock facilities as they are at present and not under Government ownership;

(3 Suggest that negotiations be entered into by the Bethlehem Company with the Navy Department to develop a long-time contract with the proviso that the Bethlehem Company buy the necessary additional equipment to satisfy the Navy in view of definite commitment by the Navy of guaranteed tonnage to be docked per year.

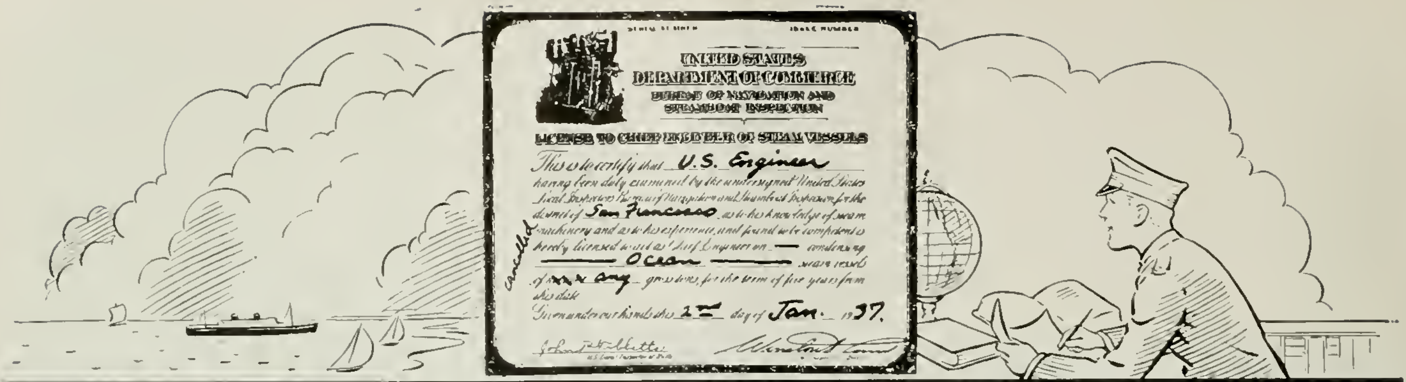
Commander L. M. Edelman.

Schoolships Alumni Quarterly Meeting

The second quarterly meeting of Schoolships Alumni of America was held at the Army & Navy Club at the Fairmont Hotel in San Francisco on April 20. L. M. Edelman was the presiding officer.

Principal speaker was Robert H. Fouke, chairman of the Board of Governors of the California Nautical School, discussing new legislative problems and favorable outlook on the possibility of securing additional Federal appropriation for maintenance of the nautical school. The speaker also discussed the bill now before Congress to replace the four present schoolships with modern and specially designed vessels. He told the need for defeating A. B. 253, which, if passed, would abolish the school.

Fouke pointed out that starting with the June, 1939, class the cadets will be awarded B.S. degrees, and previously graduated cadets who present theses on maritime subjects will be eligible for this degree. Further discussion took place concerning the newly-formed California Nautical School Association, purposes of which are to keep the school program before the maritime industry and all communities in the State.



SERIAL NUMBER

ISSUE NUMBER

UNITED STATES
DEPARTMENT OF COMMERCE
BUREAU OF NAVIGATION AND
STEAMBOAT INSPECTION

LICENSE TO CHIEF ENGINEER OF STEAM VESSELS

This is to certify that U.S. Engineer having been duly examined by the undersigned United States Local Inspectors Bureau of Navigation and Steamboat Inspection for the district of San Francisco as to his knowledge of steam machinery and as to his experience, and found to be competent is hereby licensed to act as Chief Engineer on — condensing — Ocean — steam vessels of any gross tons, for the term of five years from this date

Given under our hands this 2nd day of Jan. 1937.

Cancelled

Your Problems Answered

by "The Chief"

The word "Cancelled" was inscribed on face of the above license at the direction of the Bureau of Marine Inspection and Navigation. As used here it means "Specimen Copy."

AUXILIARIES IV

DRIVE FOR AUXILIARIES?

QUESTION

Why were auxiliaries once driven from the main unit?

ANSWER

All prime movers require auxiliaries, from the simplest motorcycle engine to the huge engines now used ashore and afloat. The method of drive for these has been an important question to every designer. The automobile engine successfully drives its auxiliaries by some sort of mechanical connection to the main shaft.

The drive of auxiliaries by direct mechanical connection from the main engine is as old as the first reciprocating steam engine, when the feed and other pumps were operated from the main cross head through levers and beams. On turbine drives the marine engineer will find it very difficult to direct drive these units. Furthermore, the activities aboard a modern ship when not under way require a full complement of engine room auxiliaries, so that drive from main engine by mechanical connection is impractical.

QUESTION

How much power do the auxiliaries take?

ANSWER

The power requirements of auxiliaries have always been great aboard ship as compared with a shoreside plant. The steam requirements on some ships have run as high as 25 per cent. One reason for the high steam requirement is the low economy of the auxiliary engines as compared to the main engines. Thus from the standpoint of steam economy of the plant it would be better to drive from the main engine.

QUESTION

What is the modern trend?

ANSWER

The trends in today's designs have been to add more and more auxiliary load; for instance, the forced and induced draft fans. Where 15 or 25 KW DC load was sufficient, now the generators must be 100, perhaps 200, KW capacity.

Oil cooling and processing, refrigeration, ventilating blowers, elevators, hoists and winches, hot, cold and sanitation water requirements have all added their share to the auxiliary load.

However, the dry and wet vacuum pump has almost entirely given way to the ejector, with the simple condensate pump of the centrifugal type.

In spite of this increasing auxiliary load the overall steam con-

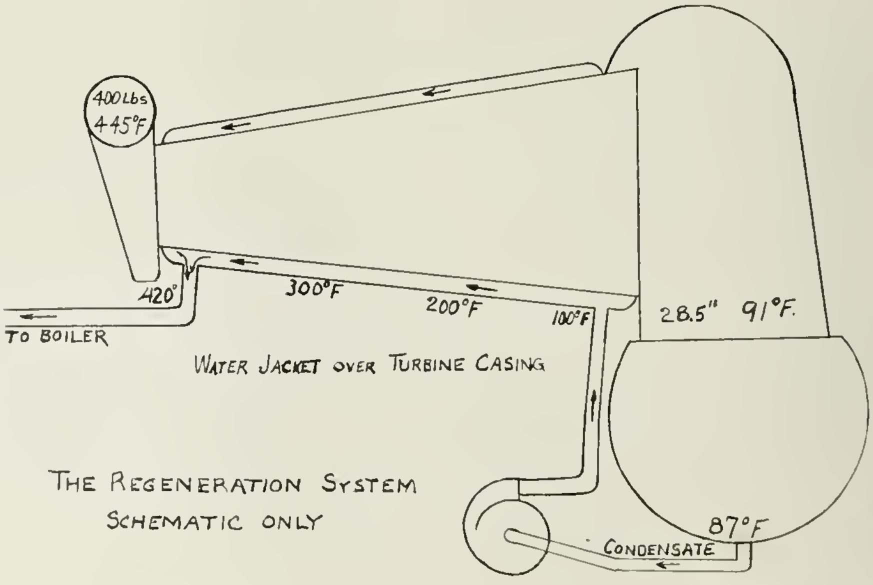


Figure 1.

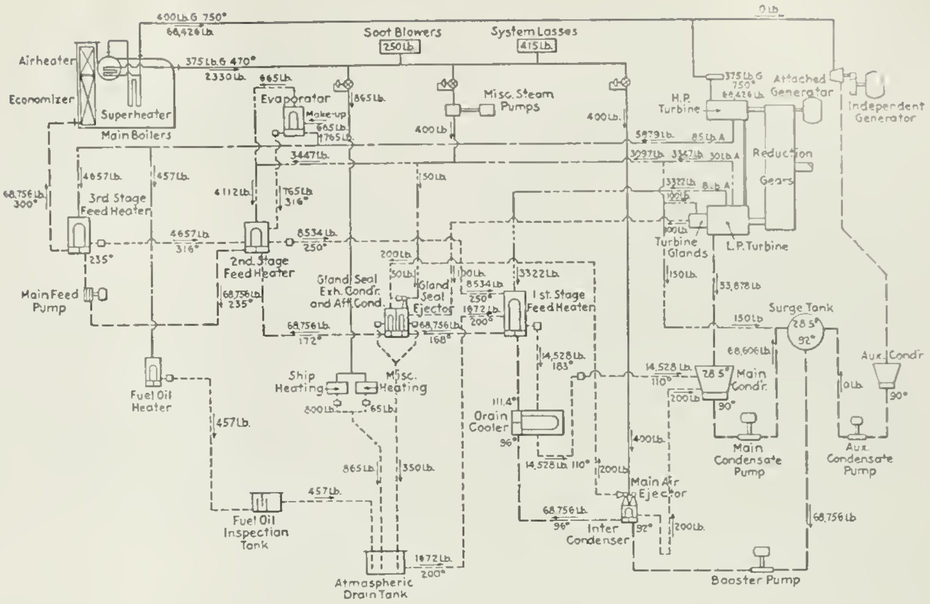


Figure 2.

sumption per shaft horsepower hour has come down. This has in part been accomplished by proper selection of auxiliary drive.

QUESTION

How can the steam requirement of auxiliaries be reduced by plant design?

ANSWER

There are two possibilities of saving. First, the saving in prime mover economy, illustrated by two turbines, one large and one small, both taking steam from the same header and exhausting to the same condenser. It is obvious that the efficiency of conversion of energy in the steam to useful work will be lower in the smaller unit.

The prime mover lowest in steam economy probably is the reciprocating full stroke steam pump. The highest is the main engine.

Direct drive being impractical, the next best is the electric drive of the auxiliary when the electric power can be generated in a fairly large and efficient condensing unit. More particularly is this true where the generator itself can be driven from the main engine gears, as illustrated in Fig. 2. Many ships now use this system, such as the "Santa" boats of the Grace Line, the S. S. Vancouver of the Hamburg-American Line, and many others.

Frequently the size of the auxiliary is too great to add to the electric load, or for other reasons it is steam driven. Feed pumps of the centrifugal type requiring high speed are frequently turbine driven.

In general it is safe to say that the best drive is the electric motor. With its generator it gives good efficiency, excellent control, reliability, can be located anywhere and requires a minimum of attention.

QUESTION

Where is the saving when the steam cycle can be changed to fit auxiliary requirements?

ANSWER

The other possibility in savings in steam is the thermodynamic system used. This is illustrated by two auxiliary steam engines of equal power, one taking boiler steam and exhausting to the condenser, the other taking boiler steam and exhausting to the auxiliary exhaust line at 5 to 15 lbs. gage. The steam from the auxiliary line then is used to heat the feed water. The condensing engine uses live steam to heat the feed water.

A little consideration will show that although the non-condensing engine takes more steam, nevertheless the overall fuel consumption of the system will be lower. This is because the steam used to heat the feed water is allowed to do some useful work, losing but little heat, before it goes to the heaters.

There are many uses for the low pressure steam aboard ship, and it is obtained by passing steam through pumps or engines to the low pressure line.

This general principle is accomplished in many ways and to a more or less extent on every ship. The main consideration is to use no steam for heat until it has been reduced to the lowest possible pressure, hence temperature, through an engine of some kind, its final temperature being just high enough to force its heat into the heater.

QUESTION

What is the regeneration system?

ANSWER

The full use of this system is called the regeneration principle, and is illustrated schematically in Fig. 1. All the heat in the feed is from steam which has done the maximum work. In this illustration the turbine has a water jacket around its casing and the feed water in being pumped to the boiler passes through this jacket, moving from the exhaust end to the steam end, thus picking up heat as it goes, there never being more than a few degrees difference in temperature between water and steam at any point.

QUESTION

What is meant by steam extraction or stage bleeding?

ANSWER

This schematic illustration is not practical and is not used in actual practice. However, it is approached by taking steam out of the turbine at several points, two or three, sometimes four, and leading it to feed heaters of the surface type. Each point is called a bleeding, and the heaters called stage heaters, each raising the water its designed number of degrees.

With the full use of stage bleeding for feed heating the use of auxiliary steam at 5 to 15 lbs. pressure is decreasing, and this pressure is supplied by extraction or bleeding from the main unit. Thus the thermodynamic system improvement calls for less use or elimination of non-condensing auxiliaries, which again indicates the use of electric motors.

QUESTION

How can both the engine efficiency and thermodynamic savings be realized?

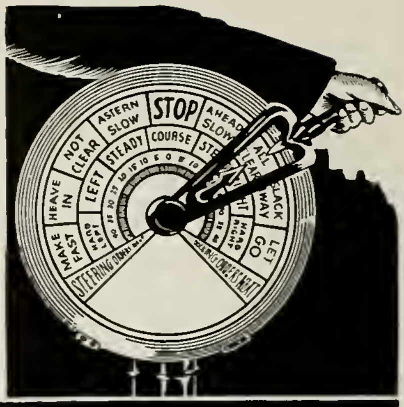
ANSWER

Figure 2 illustrates the complete use of all the principles set forth above. Note electric power comes from the main turbine except when

(Page 48, please)

Steady as you go!

KNOWLEDGE IS THE STRAIGHT COURSE TO ADVANCEMENT



A DEPARTMENT FOR DECK OFFICERS

AIR-BORNE DAMAGE TO SEA-BORNE CARGOES

VI VENTILATION OF HOLDS

By OLIVER D. COLVIN, WERNER H. E. HAHNE and MARK R. COLBY

The ventilation of cargoes with fresh air has become the most important method of trying to protect cargo from damage. It is based on the common conception that fresh air can dry up wetness and that it can carry with it foul odors and fumes. This conception is correct only as long as the supply of fresh air is large enough to remove the odors and fumes efficiently.

Regarding the drying capacity of air, we have learned that air can both take on or give off moisture, depending entirely on the condition of the air and the cargo with which it is in contact. Therefore, the ventilation of cargoes deserves close study.

Dry hygroscopic products should not be ventilated, unless odors and fumes are present, because they are likely to take on moisture instead of giving it off to the ventilating air. Steel products, canned goods and similar goods, when in dry containers, are likewise best carried in a tightly sealed hold without ventilation. Unfortunately, most cargoes are not and probably will not be available in such dry condition.

Rain, snow and other forms of precipitation wet the cargoes before and during the time of loading. Water gets to the cargo through salt-water spray, through leaks in the hull and from the bilges. This moisture must be removed through ventilation before damage occurs. As long as the dew point of the ventilating air is considerably below the temperature of the wet metal cargo, the air will pick up some of this moisture. Whether or not such ventilating air will dry the cargo sufficiently rapidly depends on the amount of ventilating air and on the efficiency of its penetration through the cargo block.

● Condensation on Metal Cargoes from Natural Ventilation

Many of the important trade routes lead from cool climates into or through warm climates, with the result that a more or less sudden rise of the atmospheric dew point and temperature is encountered on many routes. After a sudden rise in the atmospheric temperature, the cargo is likely to be colder than the dew point of the atmosphere. If this outside air is admitted to the cargo hold, moisture will condense from the air on the cold metal goods. Most endangered by such direct condensation are unwrapped steel products, such as pipes, plates, and wire. The amount of moisture which may condense on cold steel in warm weather is very considerable and may amount to several hundred pounds of water on one parcel of steel.

One officer told us that he had a case like this some time ago in a nearly empty hold. He had his men go in the hold and wipe off cold and wet steel sheets. To his surprise the result was nil and the sheets were wet again soon. He repeated this performance twice, but in vain. The principle of condensation would have told him that steel sheets are bound to get wet and stay wet as long as they are colder than the dew point of the air.

Condensation and the capillary attraction of the spaces between sheets of mirror glass caused an interesting damage case. The plates of glass were separated by paper, which soaked up the heavy condensation on the glass bundle and glued the plates together so solidly as to render them valueless.

Another type of cargo which is extremely troubled with rusting is canned goods. These are well suited to condensation damage, because the tin container is a good conductor of heat and it contains water which has a high specific heat.

Observations made by the Forest Products Laboratory in Vancouver, British Columbia, and by S. J. Duly, London, lead to the belief that the temperature differences between tin can and container are the cause of condensation on the tin. However, a temperature difference of only ½ degree, as was observed by Duly, can explain the condensation of moisture on tins only with difficulty. It is hoped that the experiments which are at present being carried out in Vancouver will enlighten us on this highly important matter.

In spite of the incomplete data on many products, there is no doubt that the ventilation of cold goods with damp and warm air leads to condensation and rust damage. Therefore, such cold goods should not be ventilated with warm humid air, and the present common practice of continuously ventilating steel and canned goods without regard to the dew point of the air and the temperature of the cargo should be discontinued.

The first steps towards improving this deplorable situation were made by the laudable efforts of Professor S. J. Duly, London, who first called attention to these facts as early as 1927. Since last year the Association of Marine Underwriters of British Columbia have taken an active interest in this matter and have set up a Research Committee on Marine Moisture Damage, which is broadcasting these facts to the marine world by means of small but valuable bulletins.

● Condensation on Deck Overhead and Ship's Sides

When a ship sails suddenly from warm weather into cold weather, the temperature of the sea water and atmosphere are likely to fall below the dew point of the air in the cargo hold. If it does, moisture will condense on the underside of the weatherdeck, the deck beams, the sides and frames of the ship. An empty hold or a hold filled with non-hygroscopic substances such as steel and canned goods still contain a considerable weight of hygroscopic materials in the form of spar ceilings, dunnage wood, wrapping materials, or cardboard containers, all of which are likely to give off moisture when they are warm and the metal of the ship is cold. The total amount of moisture released from a cargo of this type may be assumed to be of the order of a few hundred pounds of moisture in a single cargo space.

In bad weather when the ventilators have to be kept closed, all of this moisture will condense on those parts of the ship's structure which are exposed to the atmosphere and sea water. However, 400 pounds of condensation in a shelter deck space 60 feet long is not very noticeable and theoretically will cover the deck head and sides to a thickness of about 0.01 inch. This will cause a small amount of dripping, but cannot be considered serious.

Some molding and musty odors may develop in the closed hold, due to the interruption of ventilation. When the vents are opened again, and wind, weather and moisture conditions are satisfactory, the condensed moisture is evaporated again, and after about one day the hold will be dry.

If more than a few hundred pounds condense in the closed hold described above, drops of moisture will drip on the cargo and produce staining and rust in the surface layer. Absorbent or impervious tarpaulins, paper and matting will be of some assistance and may take care of considerable condensation; but the capacity of these aids is limited. In the case of moisture damage with ships equipped as they now are, cold weather and closing the vents should share the blame.

The picture changes materially in a cargo hold which is filled with damp and warm hygroscopic cargo. For example, take a ship with a cargo of rice in a lower hold consigned from East Indies to British Columbia. Some 300 tons of this cargo is likely to be high in humidity containing, say, 16 to 17 per cent moisture. The vapor pressure in the rice bags and dew point in the air vary with moisture content of rice, and may be assumed to be between 70 and 80 degrees. The rice containing excessive moisture is respiring and spontaneous heating will become noticeable in the parcel after a few days. Such heating will result in higher vapor pressure in the rice and higher dew point in the air.

The average air condition in Burma during April is a temperature of about 85 degrees and a relative humidity around 65 per cent.

When the rice is ventilated with atmospheric air by natural drafts, as is customary, moisture from the rice, which has a higher vapor pressure, will tend to diffuse into the ventilating air. The air leaving the rice ventilators and the surface of the rice will have about the same vapor pressure as that of the rice, with which it was in contact. Let us assume the average dew point of the exhaust air to be 77 degrees. Then every pound of air which passes through the cargo hold picks up 23 grains of moisture.

Based on studies by Dr. Michler, Berlin, and others, the air in an empty cargo hold is changed about once every hour under favorable wind conditions, if the ventilator cowls are trimmed correctly. In 24 hours about 43 tons of ventilating air would pass through the above rice hold, assuming it to have 50,000 cubic feet grain capacity. This 43 tons of air will carry with it about 280 pounds of moisture when every pound removes 23 grains.

It was assumed at the beginning of this example that 300 tons of the cargo in this hold contained excessive moisture. At least 2 per cent of the moisture must be removed from the above damp parcel of rice, containing 16 to 17 per cent of moisture. This amounts to a total of 6 tons of moisture in the 300-ton parcel. Assuming that the remainder of the rice contains less than 14 per cent, and therefore requires no moisture removal, the above calculations indicate that natural ventilation at its best would require about 43 days to remove the 6 tons of excessive moisture from the rice. Obviously, by that time the rice will be badly heated.

Forty-three tons of ventilating air will cool the entire cargo about 1 degree per day under the above conditions. This does not consider any spontaneous heating in the rice, which would easily offset the slight cooling action of the air.

Both moisture transfer and heat transfer effected with natural ventilation under the above conditions are comparatively small. Natural ventilation cannot hope to prevent spontaneous heating in a parcel of rice which was loaded with an excessive moisture content.

The situation grows even more difficult when this rice ship encounters cold weather. On the voyage along the islands of Japan, the seawater and atmospheric temperatures decrease very gradually. Following the great circle the ship enters cold water rather suddenly north of latitude 40° N. This section is also known for its severe storms, which

(Page 48, please)

S. S. Panama

First of Three Twin Screw Drive Cargo and

Trial Trip Data

Standardization trials of S.S. Panama were run off Rockland, Me., on April 7, 1939. Weighted average of the three high speed runs was 18.766 knots with 9138 S.H.P. and 98.28 r.p.m. of propellers. At an average speed of 16.205 knots the S.H.P. was 5420 and the r.p.m. of propellers 83.88. The displacement at beginning the measured mile runs was 10,080 tons.

The trials were entirely satisfactory in all respects, speed, power, fuel consumption and maneuverability, and everyone on board was favorably impressed by the performance of the ship, machinery and auxiliaries, her behavior at sea and the complete absence of vibration.

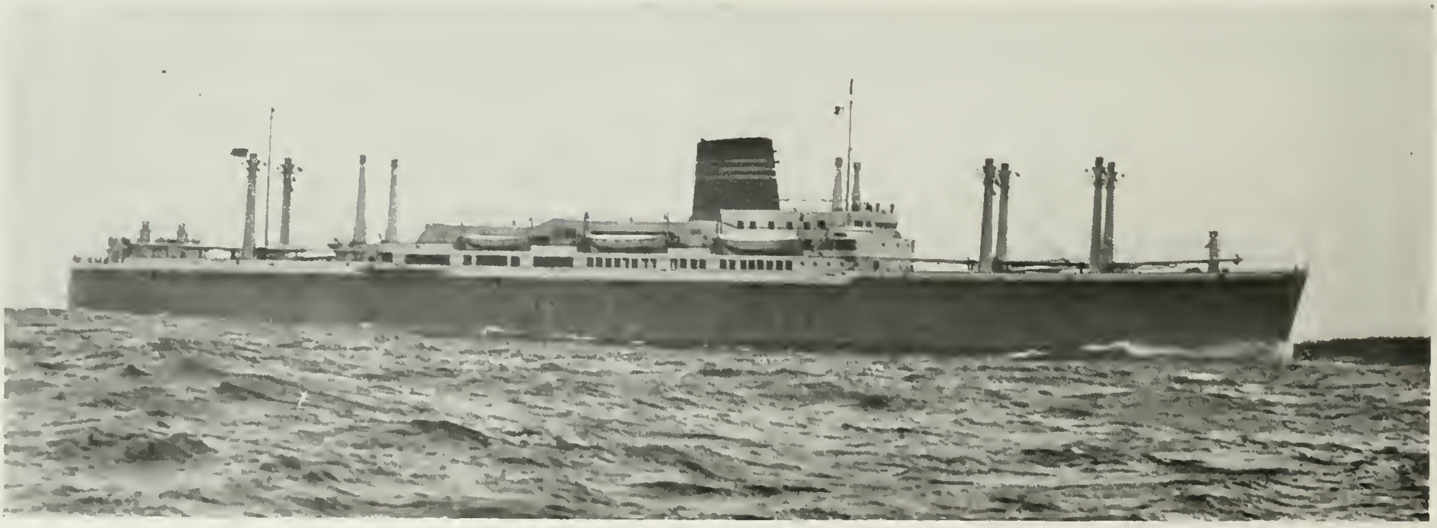
First of three twin-screw passenger and cargo ships, the S.S. Panama, designed by George G. Sharp, naval architect, for the Panama Line, and built by the Shipbuilding Division of the Bethlehem Steel Co., Quincy, Mass., sailed from New York April 27 on her maiden voyage, in regular service to the Canal Zone.

Widely acclaimed as the first of the modern ships of the new American merchant marine, the Panama may be said to mark the beginning of a new era in shipbuilding in standards of safety, efficiency, comfort and attractiveness. Unique in many respects, this ship represents, as a whole, the principles of design and construction formulated by the naval architect on the basis of his long experience.

Among the distinctive features are: absence of sheer; simplicity in structural design; provisions for safety in the prevention of fire far beyond anything before attempted in ship construction; unusual arrangement and furnishing of passenger accommodations, including the grouping of staterooms about private verandas, giving a direct opening on deck and a view of the sea; efficient cargo handling gear, including built-in conveyors; and an especially pleasing and harmonious exterior, the superstructure and stack being so proportioned as to make a well balanced profile, giving the vessel a graceful, clean, fair aspect.

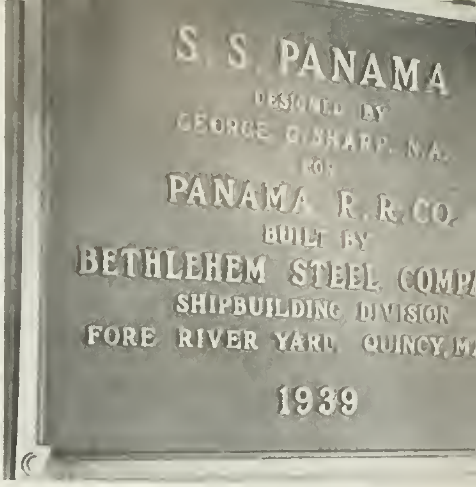
This modern American passenger and cargo liner will compare favorably in safety, comfort and appearance with the finest new ships of her class under any flag and is a credit to her designer, builder and owner.

The Panama is a steel steamship, transversely framed, with continuous bridge or promenade deck, raked stem, and cruiser stern. The general dimensions and characteristics are shown in the table herewith and the general arrangement of passenger and cargo spaces is indicated on the insert drawing herewith.



S.S. Panama on her trials off Rockland, Maine. This ship and her sisters accentuate the modern straight streamline design with no sheer.

Geared Steam Turbine Passenger Liners



Subdivision

Because of the ship's ample freeboard, no difficulty was encountered in the elimination of sheer. The flooding curve for the final arrangement of holds and tanks indicates that with respect to trim after damage the desired two-compartment standard is considerably exceeded. In fact, for all practical purposes the ship may be said to be a three-compartment ship throughout its length.

There are 10 main transverse watertight bulkheads. Local subdivision in the machinery spaces provides additional protection for these vital parts of the ship.

Investigation of transverse stability after flooding of one compartment or any two adjacent compartments indicates that adequate metacentric heights can easily be maintained in service.

The integrity of watertight bulkheads is insured by the fitting of seven horizontal electrically operated sliding watertight doors controlled from the wheelhouse.

Structural Design

In regard to the structural design, the aim has been to attain simplicity and adaptability to the functions of the ship, without sacrifice of structural efficiency. First, the absence of sheer simplifies the entire construction of the ship. Second, an arrangement of structural members was adopted which would integrate with the general arrangement of the ship and the layout of piping, ventilation, and electrical systems. "The method . . . consists of a system of vertical columns extending generally the full depth of the vessel and superstructure and continued above the weather decks for ventilation and, in way of cargo holds, also for derrick posts. Generally . . . these columns are arranged at main subdivision bulkheads with a system of . . . semi-box girders connecting thereto and continued essentially throughout the length of the vessel at each deck level, combining with a system of transverse hatch . . . beams connected to web frames at the sides of the vessel." (Adapted from Mr. Sharp's 1937 paper on "Fire Control for Passenger Vessels.") All pillars, girders, and double bottom longitudinals, as well as bulkheads, hatches and trunks, are in vertical alignment—on three lines, at 2′ 6″, 15′ 0″, and 17′ 6″ from the center line on either side, and all bulkheads and partitions are on frame lines.

GENERAL CHARACTERISTICS

Length overall	493 feet 6 inches
Length on waterline	486 feet 6 inches
Length between perpendiculars	471 feet 6 inches
Beam, molded	64 feet
Depth to B Deck	29 feet 9 inches
Depth to A Deck	38 feet 6 inches
Depth to Promenade Deck	46 feet 9 inches
Decks have no camber, no sheer	
Designed load draft, molded	26 feet
Deadweight on load draft	6800 tons
Gross tonnage	10,021.42
Net tonnage	5925
Normal speed in service	16½ knots
Shaft horsepower in service	9500
Principal Net Capacities:	
General cargo, cubic feet	292,410
Refrigerated cargo, cubic feet	90,460
Baggage rooms, mail rooms, etc., cubic feet	4970
Ship's cold storage, cubic feet	4820
Ship's dry stores, cubic feet	4970
Bunkers at 37 cubic feet per ton, tons	1557
Fresh water, tons	798
Salt water ballast (peaks and shaft alley tanks)	361
Cabin Passengers (one class)	
Total passengers	202
Crew	124
Total passengers and crew	326

The vessel is built of mild steel to American Bureau Classification +A-1 (E), with inner bottom and five decks up to and including the promenade deck, which is the uppermost continuous deck and "strength deck".

All decks are completely plated; the steel surface of bulkheads, trunks, and girders, with no other covering than paint, has been frankly exposed in many locations through the passengers' and crew's accommodations and in the public rooms. Continuous doublers are carried along in line with deckhouses and girders on promenade deck, reinforcing the plating around all main hatchways and other openings.

The ship's structure is generally riveted throughout, except tank margin plate, which is welded to shell and frames. Girders are built up by welding and riveted to the adjoining structure. Extensive use of welding is made in fittings and in fastenings of minor parts.

General Arrangement

In general arrangement the ship is unique in many respects, particularly in passenger accommodations, where maximum comfort and spaciousness in public rooms and staterooms are combined with simplicity of structure, ventilation and piping. The buff stack, with three horizontal aluminum bands, the bow emblem, and the blue-grey hull with green boot-topping and white superstructure give the ship a pleasing exterior. Because of the spaciousness of the decks and public rooms, the width of the corridors, and size of the staterooms and verandas, the general feeling is that of a considerably larger vessel with luxuriousness beyond that ordinarily found in a service of this kind.

The ship has a long superstructure amidships, extending fore and aft 226 feet on the boat deck and 171 feet on the sun deck. There are five cargo hatches served by derricks mounted on kingposts. The large oval stack not only encloses the uptakes from the boiler but houses the radio room, the induced draft fans for the power plant, and the Tyfon whistles.

The vessel has seven decks above the inner bottom, which are named: Sun Deck, Boat Deck, Promenade Deck, "A" Deck, "B" Deck, "C" Deck, "D" Deck.

Promenade, "A" and "B" Decks are continuous throughout the length of the ship.

Cargo Spaces

There are seven cargo holds, two of which are arranged for carrying refrigerated cargo, which is loaded through two side ports on each side of the ship at "B" deck into athwartship loading passages and distributed to the various deck levels by means of permanently installed conveyors.

No. 1 hatch is 16 feet by 12 feet athwartship; No. 2 hatch and No. 3 hatch are 16 feet 4 inches by 30 feet athwartship; No. 6 hatch is 18 feet 8 inches by 35 feet athwartship; and No. 7 hatch is 18 feet 8 inches by 12 feet athwartship.

The hatch covers are of the pontoon type in sections of convenient size and are lifted out by means of lugs which are integral with the corner castings. The pontoon sections are built up of light steel plates welded together.

Access and ventilation to cargo holds are provided through structural columns on bulkheads. Ladders are fitted in these trunks and there are doors at each tween deck space. Watertight or weathertight doors are fitted in each kingpost and vent trunk, opening onto a weather deck.

Passenger Accommodations

Arrangement of passenger accommodations is one of the distinctive features of the vessel. The following principles have been applied:

(1) Access. Within accommodations for regular service and for escape from fire there are centerline corridors (divided uptakes), and stairway enclosures in way of the main vertical vent trunks. In conjunction with fire screens and use of fire-resisting materials, the fire hazard is thus attacked at the very beginning.

(2) Light and air are assured by generous open deck space and spacious public rooms. Majority of staterooms are arranged on the veranda system developed by the naval architect so that,

(a) Every room is virtually an outside room,

(b) Veranda provides an attractive deck space for the occupants of adjoining staterooms.

(3) Ventilation. The arrangement of verandas permits simplified mechanical ventilation by means of short branch supply and exhaust ducts from the main vertical trunks. Longitudinal supply ducts are enclosed in the girders. Structural vent ducts at bulkheads are used for ventilating crew's quarters, machinery spaces and cargo holds.

(4) Bathroom arrangement provides for a bathroom to every room, with an economical plumbing layout. All bathrooms line up vertically in order to simplify piping. On "A" deck supply lines are carried overhead in the corridor between the girders.

(5) Fire-resistant construction is used throughout for accommodation bulkheads, using the Sharp patented method of panel design and assembly. In general, a definite attempt has been made to prevent the inception of fire and to simplify erection of accommodation bulkheads.

Crew Accommodations

The entire crew is accommodated in rooms for one, two, three and four persons mainly on "A" Deck aft. The deck house, located at the stern of the ship, is used to accommodate members of the deck crew and also encloses the emergency generator room.

The chief engineer and doctor are berthed in quarters located aft of passenger staterooms on Promenade Deck. The staterooms for the captain and deck officers and radio operators are located on the Sun Deck abaft the bridge.

The vessel is manned by a crew of 124 officers and men.

Service Spaces

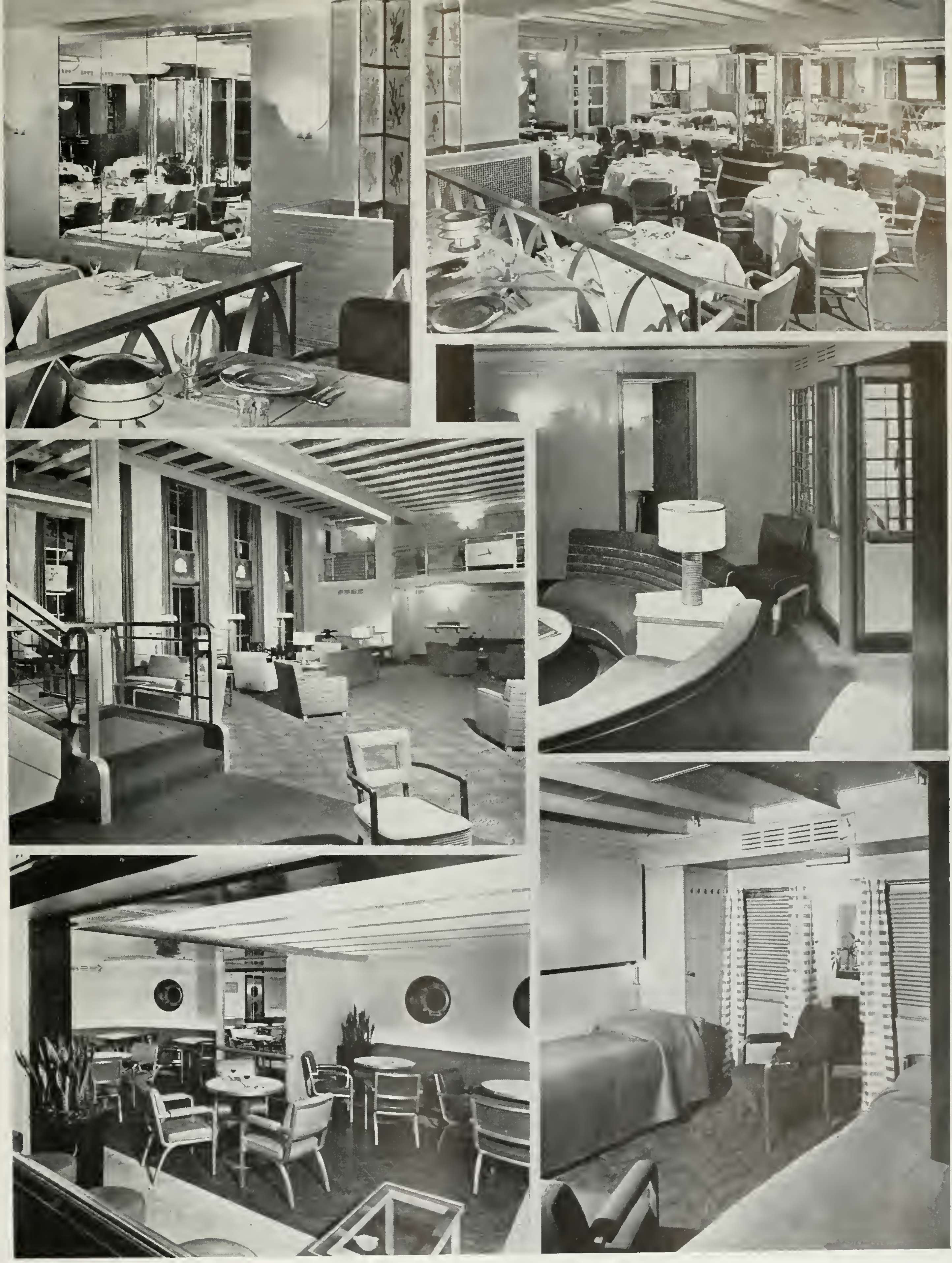
The galley and adjacent service spaces are aft of the dining room on "B" Deck and are designed for serving both passengers and crew with maximum efficiency. Four crew mess rooms are located immediately aft of the galley and permit the crew to be fed directly from the kitchen in the same manner as the passengers.

The storerooms, both dry and refrigerated, are located on "B" Deck immediately aft of the mess rooms.

By concentrating all service spaces, storerooms, mess rooms and dining room in one section of the same deck, efficient service is promoted and footwork reduced to a minimum.

The galley is divided into two sections by the center passage and faces on the service passage, which is immediately forward of it. The dining room is served through the center passage and all traffic keeps to the right and is routed so as to avoid all crossing and confusion.

In order to reduce steps as much



INTERIORS OF PASSENGER ACCOMMODATIONS

Upper left: Dining room. Upper right: Dining room. The entire room acquires a brilliant quality by making use of glass, polished copper and etched panels. The general color scheme of blue, the informal built-in seating arrangements and the use of canary yellow table linen make this a gay and attractive dining place. Center left: View showing the main hall or salon. The design is in a simple, restrained modern style that might easily be characterized by the term "Contemporary American." Especially interesting is the use of stainless steel, aluminum, glass and synthetic plastics; pleasant glareless illumination; and the use of mirrors. Center right: A stateroom veranda. Lower left: Club room. Lower right: View showing interior of stateroom. These rooms are simple, delightful and restful, and are arranged in groups of four around private verandas.

as possible, each section of the kitchen has a long refrigerated dresser where food which has been prepared in advance may be stored until required.

The dishwashing room is located outboard on the port side immediately forward of the serving passage.

The galley and pantries are finished and equipped in the finest possible manner. All equipment is electric, with the exception of the steam table, hot press, egg boiler, stock pots, coffee and hot water urns.

Dressers, sinks and refrigerators are of stainless steel. Fronts are recessed beyond the tops, and the nonskid terrazzo floor is coved up into a recessed toe space.

Refrigerated storerooms are generous in size and are insulated in the same manner as the refrigerated cargo space. All spaces are cooled by means of coils, except the vegetable room, where two units supply the cold air and maintain a proper circulation.

Shelving is of smooth small mesh expanded metal mounted on galvanized steel racks.

Dry storerooms are fitted out with stainless steel tilling bins for bulk stores, and galvanized steel small mesh shelving for case items. Mechanical supply and exhaust ventilation is installed.

Deck Coverings and Insulation

All decks exposed to the weather are covered by calked wood decks of 2¾ inches thick Oregon pine fastened by means of stud bolts welded to the steel deck. Waterways in way of passenger accommodations, deck enclosures and main superstructure are covered by neat wood gratings. Waterways have been run along all deck houses and along the above deck girders fore and aft of the superstructure to provide good drainage.

The galley and all pantries and service spaces have terrazzo floors with an alundum non-slip content. All bathrooms, toilets and showers have floors of ceramic tile with 6-inch sanitary cove bases. Tile wainscots have been installed in all officers' and crew's baths, showers and toilets, and also in the baths for the passengers' de luxe staterooms.

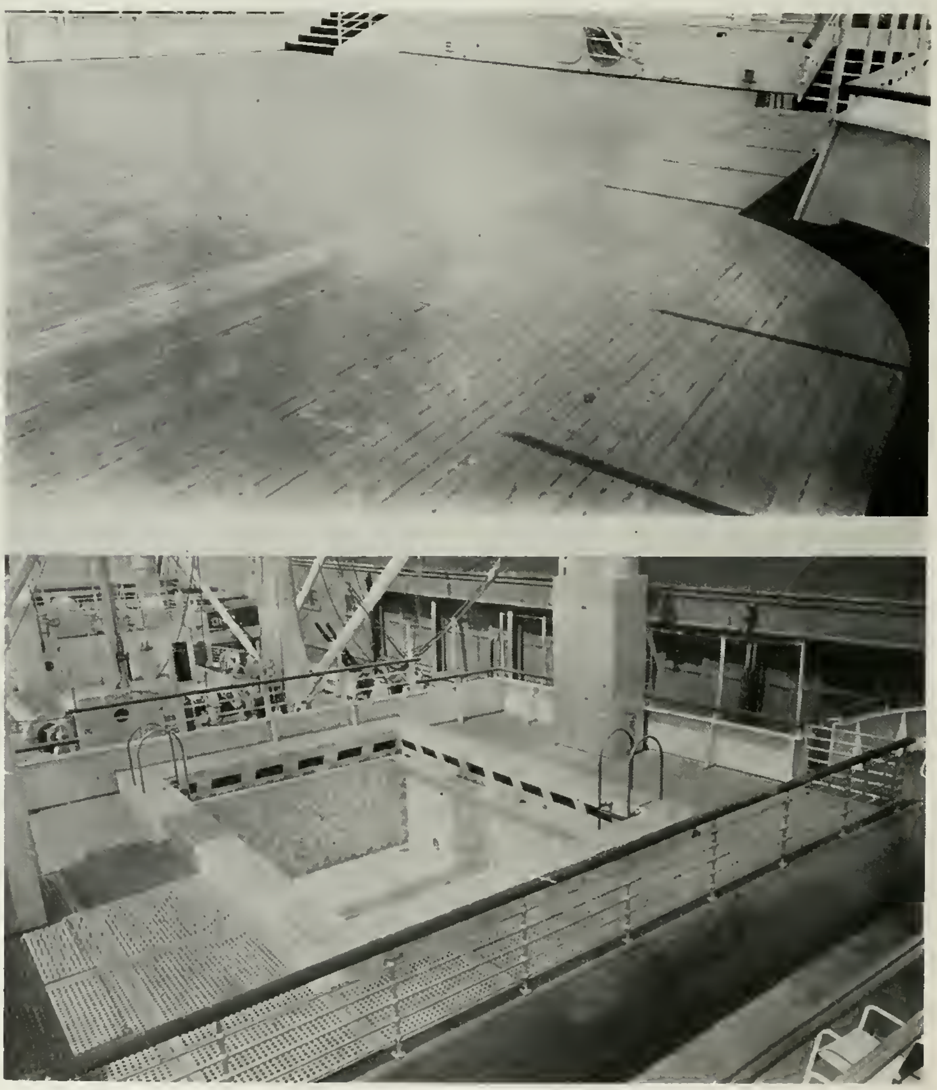
All deck spaces throughout the passenger and crew accommodation, as well as the public rooms, have been covered by magnesite furnished and installed by the Selby-Battersby Company. Rubber cove bases by the Goodyear Rubber Company are installed throughout these spaces.

The exterior boundaries of passengers' and crew's accommodations, as well as some storerooms, have been insulated. Exceptions are the underside of steel decks where, covered by wood decking in way of crew accommodations or the exterior walls of dining room, there is a wide air space covered by paneling, or the exterior walls of staterooms sheltered by an overhanging deck on the outside.

Insulation is also installed in all locations where there would be an appreciable transfer of heat from one compartment to another and on the fire screen bulkheads. All insulation, as well as the Flex-o-board insulation covering in way of accommodations, has been supplied by the Johns-Manville Corporation.

Decoration and Furnishings

In the general planning of the ship the naval architect has been eminently successful in obtaining the maximum in convenient arrangement and symmetrical layout of rooms and groups of rooms. By integrating the ventilation and electrical systems with the ship's structure, and through the even spacing of webs, use of the Sharp system of bulkheading, and the uniform location and grouping of openings, ports and windows, a background has been provided for such an expert stylist and colorist as Raymond F. Loewy. Against this background he has given unlimited play to his ability in the decorative treatment of the public rooms and passenger, of-



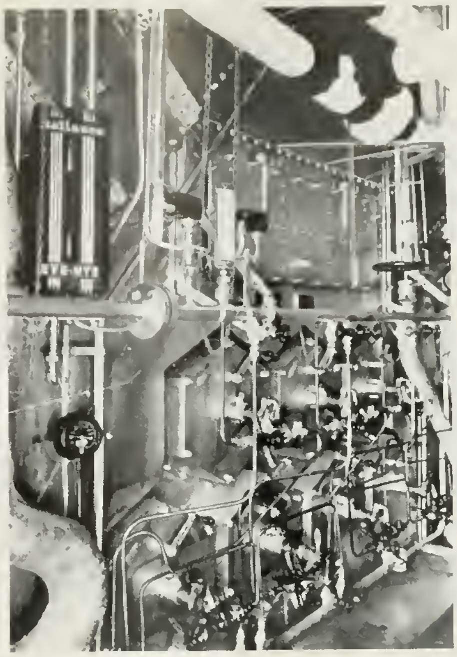
Wide open spaces are featured on the weather decks of S.S. Panama. Upper: A portion of Sun Deck looking forward. Lower: The built-in open air swimming pool.

ficer and crew accommodations.

The decorations, electric fixtures and furnishings are both distinctive and unusual, the general feeling being one of spaciousness and the atmosphere of luxurious ease. This effect is greatly enhanced by the judicious use of peach colored wall mirrors, direct and indirect lighting, soft and colorful hangings and upholstery fabrics on aluminum furniture, while soft pastel colorings predominate throughout with bits of contrasting color in appropriate locations.

The generally light decorative scheme is especially appropriate for this ship, as her run is to the tropics.

Most of the ship's furniture, as well as electric lighting fixtures, was specially designed by Mr. Loewy, while some of the aluminum chairs of approved design by the General Fireproofing Company were made additionally attractive and comfortable by the adding of tasteful fabric upholstering. Carpeting throughout is of luxurious quality, of different weaves, figured and broadloom, while hangings are of the finest fabrics, delicately harmonizing with the various color schemes.



Three views in engine and boiler rooms. Upper left: Bailey master control panel for the automatic adjustment of air-fuel ratios, draft, and steam flow. Above: Front of one of the Bethlehem boilers, featuring the seven Todd "Hex-Press" oil burners. Below: General view of the Bethlehem main propulsion turbines in the engine room.

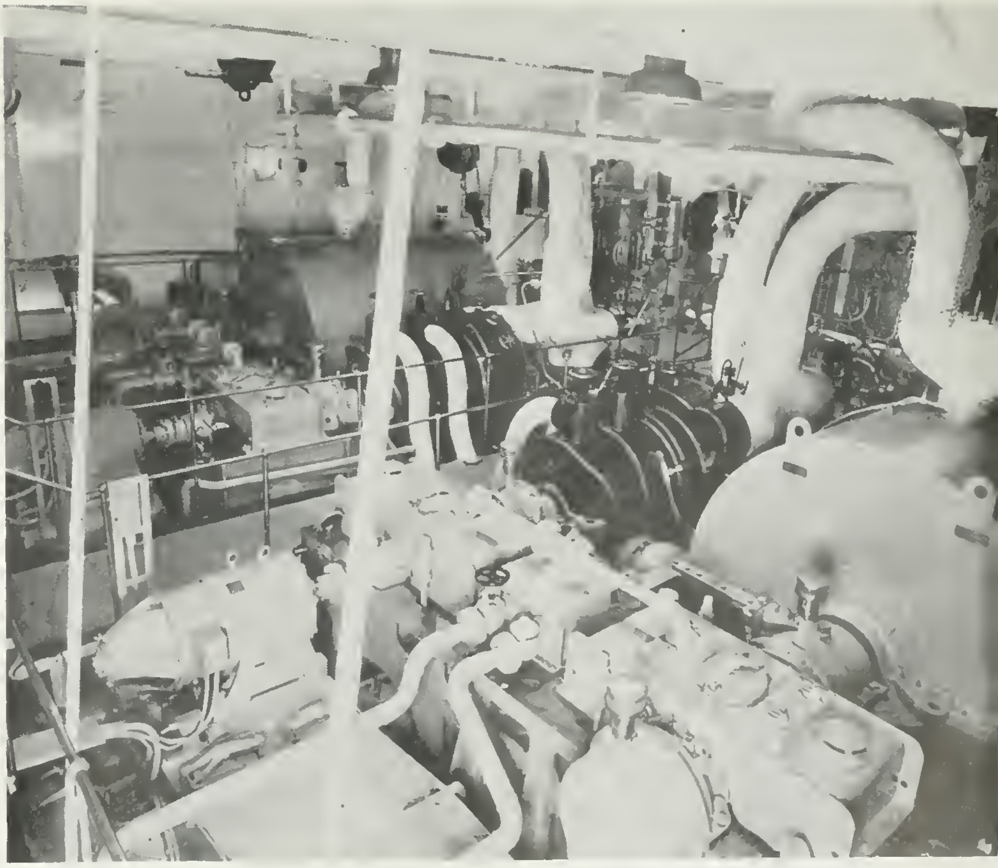
Sound Reproducing

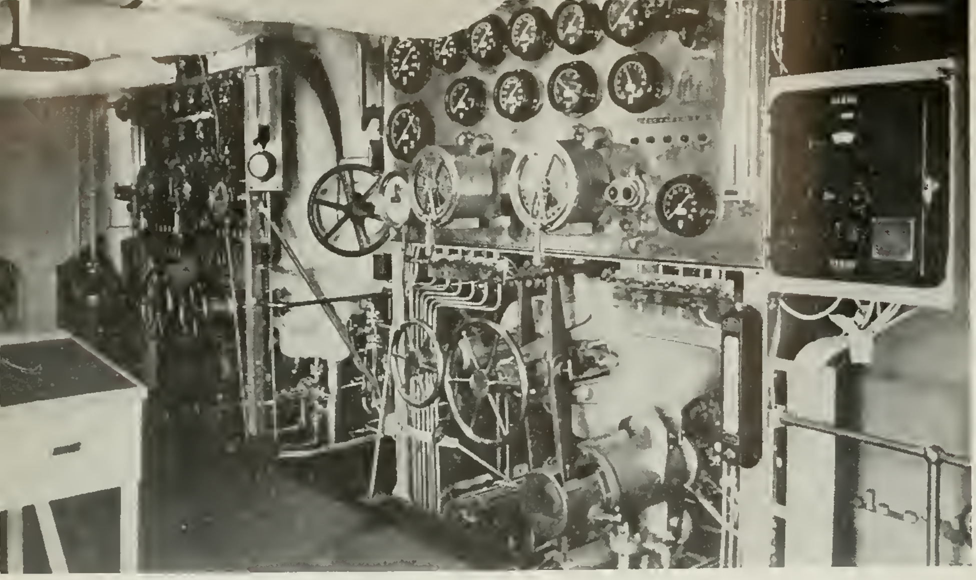
An unusual installation of sound equipment for the reproduction of recorded music has been installed by the Langevin Company, New York, dealers in Western Electric sound reproducing apparatus. Panama will carry the first electrical transcription mechanism for playing "vertical cut" recordings ever to operate on an ocean-going vessel.

Special concealed loudspeakers at each recreation center will project carefully prepared programs to the dining room, hall, sun deck, swimming pool, deck cafe, and the bar. This system includes facilities for picking up radio broadcasts, for reproducing ordinary phonograph records, and for the reenforcement of "live" shows originating in the hall.

Propelling Machinery

General Arrangement: The Bethlehem main propulsion units for the twin-screw Panama Railroad Line ships consist of two cross compound double reduction geared turbines. The normal rating is 4500 shaft horsepower per unit at 90 revolutions per minute when operating with steam at 450 pounds per square inch gage pressure, 740 degrees F. total temperature, and 28.4 inches vacuum.





Operating platform in engine room, with turbine and boiler controls.

The units include a combined impulse-reaction high pressure turbine in series with an all reaction low-pressure turbine, each turbine driving its own high-speed pinion through flexible couplings. A two-stage impulse astern turbine is mounted in the exhaust end of the low-pressure turbine casing.

The reduction gear was supplied by the Falk Corporation and has two high-speed pinions and gears, each high-speed gear driving its low-speed pinion through a quill shaft and flexible coupling, and the two low-speed pinions driving the main gear.

The high-pressure turbine has one stage of impulse blading with two moving rows followed by five expansions of reaction blading, totaling twenty-two moving rows, and runs 5320 revolutions per minute at rated power.

The ahead low-pressure turbine is of the single flow, conical rotor type, having twenty-five moving rows of reaction blading, and running 2900 revolutions per minute at rated power.

In both high and low pressure turbines balancing dummies are fitted to partially neutralize the end thrust due to steam pressure. The unbalanced thrust is absorbed by pivoted pad thrust bearings at the forward end of turbine.

An impulse astern turbine is incorporated in the low-pressure turbine casing and is designed to deliver 80 per cent of full ahead shaft torque at 45 revolutions per minute of the main shaft. There are two stages of impulse blading separated by a diaphragm containing the second stage nozzles, and having a shaft packing of the labyrinth type. The first stage wheel carries three rows of blading and the second stage two rows. A steam guide is formed integrally with the rotor to prevent direct impingement of steam leaving the astern blading on the ahead blades.

The ahead and astern throttle valves are of the single disk type with balancing piston and pilot valve. The ahead valve only is connected to a governor mechanism in order that astern steam will always be instantly available for stopping the shaft in an emergency. A guardian valve is placed between the astern throttle and astern turbine.

The propellers are four-bladed, of solid manganese bronze, 17′-6″ in diameter and 20′-6″ in pitch, each weighing 19,000 lbs., supplied by Hyde Windlass Co. The line and tail shafting of forged heat treated steel, rough turned, was supplied by the Bethlehem Steel Co., and was finished and balanced by the shipyard. Propeller thrust is taken on a six shoe self-aligning-equalizing Kingsbury bearing incorporated in the forward end of the main gear casing.

For each propelling unit there is one independent condenser of Bethlehem two pass, reheating type with 6002 square feet of cooling surface. It is designed to maintain 28.4 inches of vacuum under full power conditions with 80 degrees F. circulating water.

Vacuum in the main condensers is maintained by means of two sets of C. H. Wheeler air ejectors, located one port and one starboard. Each set has two stages and is connected to a combined inter and after cooler with condensate from the main condensers for circulation.

Lubricating Oil System

Separate and independent forced lubrication systems are installed for each port and starboard main propelling unit. The lubricating oil is drawn from sump tanks under the reduction gear and pumped through duplex strainers and oil coolers to the bearings. Two lubrication oil gravity tanks are installed in the engine hatch.

One DeLaval lubricating oil purifier, having a capacity of 350 g.p.h. has been installed. A storage tank and one reclaiming tank, fitted with steam heating coils, are of sufficient capacity to hold all of the lubricating oil in either system for purification.

An oil separator for bilge and ballast water is located in the engine room. The separator was supplied by the Bethlehem Steel Co., has a capacity of 50 tons of oily water per hour, and may be operated regardless of the trim of the ship.

Main Boilers

The steam generating plant consists of two Bethlehem three-drum, "A" type, double gas flow watertube boilers. Each boiler is equipped with a single drum type superheater and two air heater sections. Seven Todd burners of the wide range type are fitted to each boiler, to burn oil under induced draft. A complete set of Bailey automatic combustion controls is also fitted.

The two boilers were designed to evaporate at least 92,000 pounds of steam per hour at 445 pounds per square inch gage and about 750 degrees total temperature (maximum) at superheater outlet, when supplied with feed of 314 degrees F. The designed boiler efficiency is 86½ per cent.

Each boiler has 9200 square feet of generating surface, 2000 square feet of superheating surface and 4200 square feet of air heater surface. The furnace volume is 830 cubic feet.

Air for combustion is supplied by two motor-driven induced draft fans furnished by B. F. Sturtevant Co. Each fan has a capacity of 22,500 C.F.M. at a temperature of 400 de-

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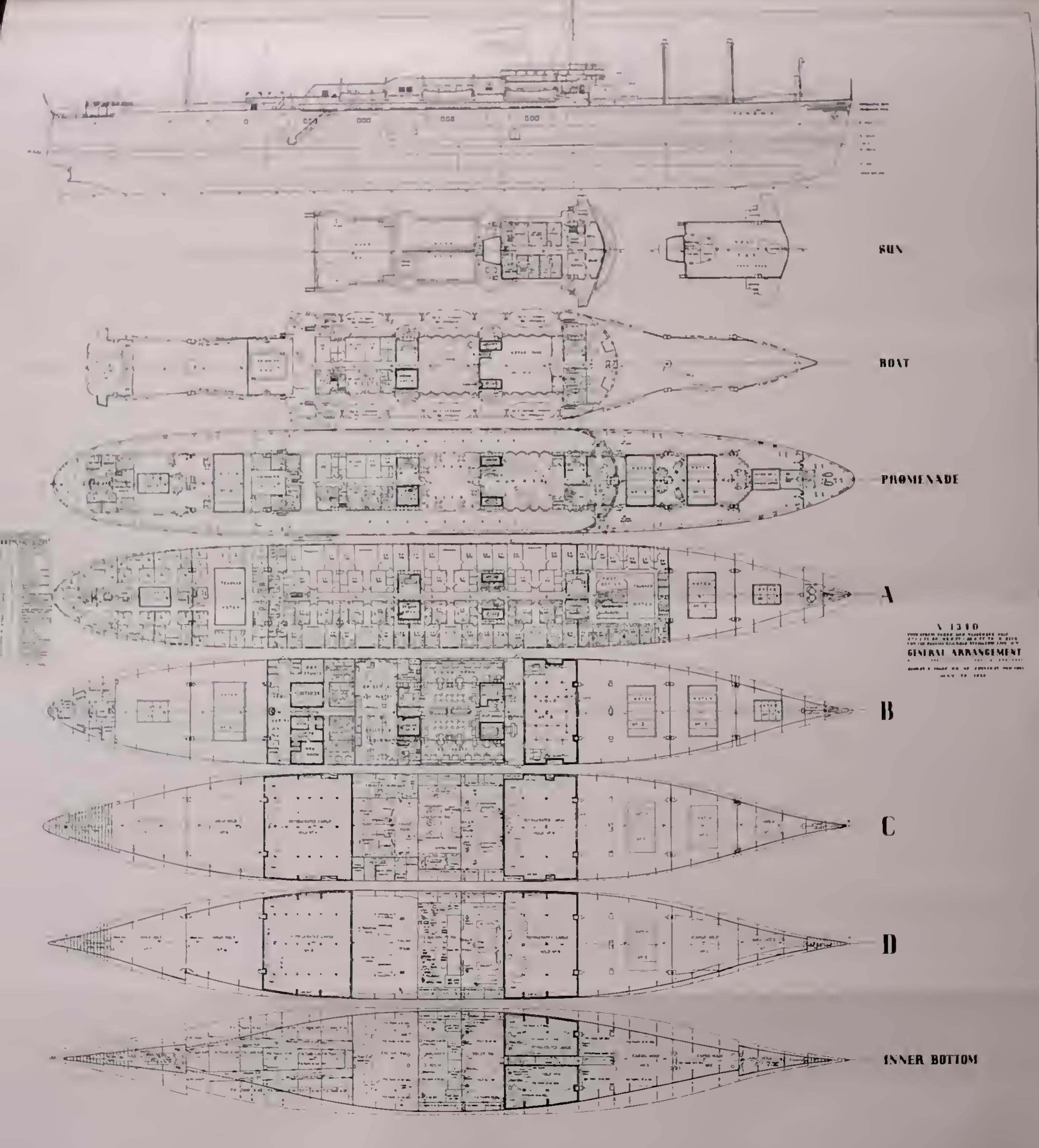
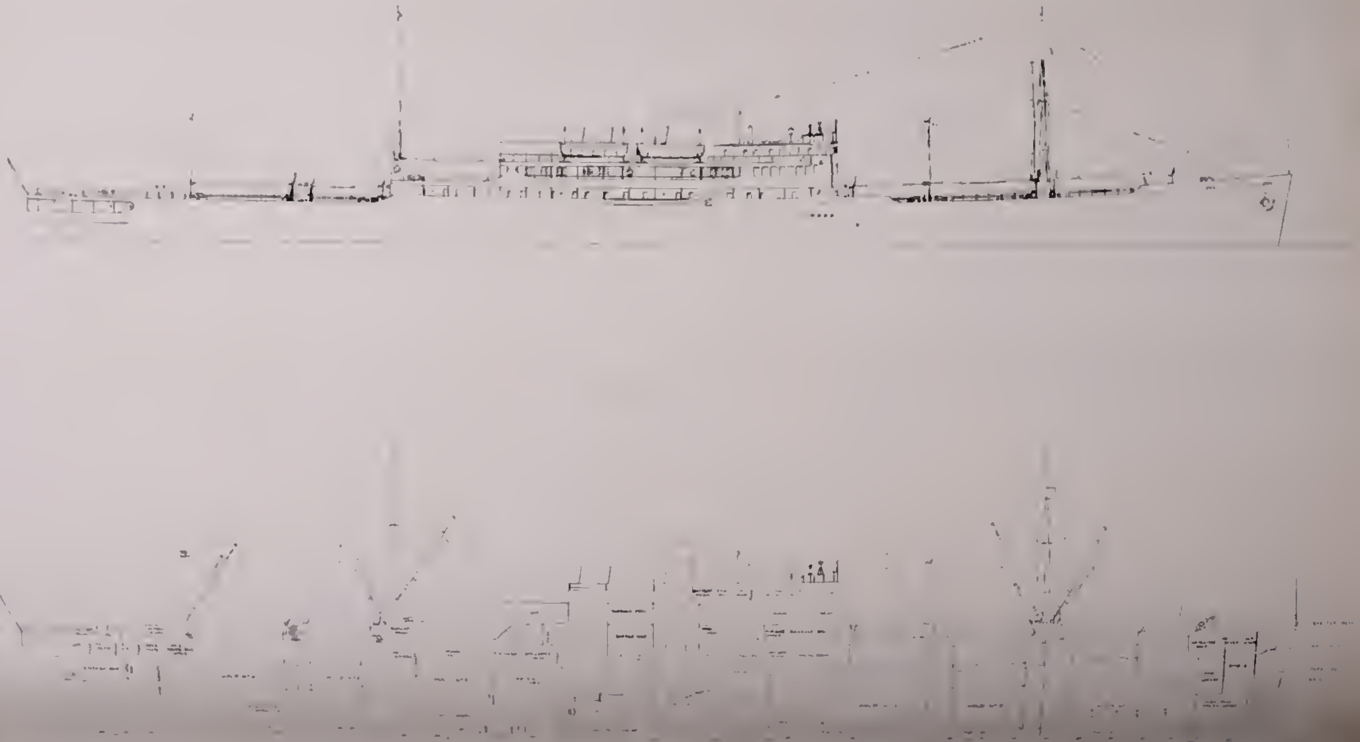

SUN
BOAT
PROMENADE
A
B
C
D
INNER BOTTOM
1310
GENERAL ARRANGEMENT



Inboard and outboard profiles of combination liners for the [illegible] Line, now under construction at Fore River Yard of Bethlehem

Delta Line Combination Liners

Keel Laid for First of Three Fast Vessels for New Orleans--South America Service.

The keel for the first of three fine new combination passenger-cargo ships to be built for the Gulf and South America service of the Mississippi Shipping Company was laid at the Sparrows Point, Maryland, plant of the Bethlehem Steel Company on April 10, inaugurating a program for construction of the finest American flag ships to operate between Gulf ports and the East Coast of South America. This building program planned and originated by N. O. Pedrick, president of the Mississippi Shipping Company at New Orleans, and one of the nation's foremost shipping executives, will be carried out under provisions of the amended Merchant Marine Act of 1936 and a long-term operating subsidy contract between the company and the United States Maritime Commission.

Designed by V. M. Friede, New Orleans naval architect, and built under his supervision, these ships will be entitled to the American Bureau of Shipping's highest rating as ocean-going mail, passenger and cargo liners and will be constructed to conform to the latest rules and specifications of all controlling governmental agencies.

Providing luxurious accommodations for 63 passengers, the ships will each have: a displacement of 14,200 tons; an approximate deadweight of 8,900 tons; an overall length of 492 feet; a beam of 65 feet, 6 inches; a loaded draft of 25 feet, 6 inches; and a sustained sea speed at load draft of 16½ knots, easily the fastest time ever maintained by American flag ships operating between the Gulf and the ports of Brazil and the River Plate.

Of two compartment design, the hull will have three complete decks —shelter (bulkhead) deck, main deck and 'tween deck. Six cargo holds will be provided with upper and lower 'tween decks. Three holds will be located forward and three aft of the machinery spaces. The six cargo hatches will be served by 14 high speed electric cargo winches and 14 five-ton steel cargo booms. One 30-ton jumbo boom is provided for hatch No. 2. Each of the vessels will be provided with two 5000-cubic-foot refrigerated cargo compartments for transporting fruit and other perishable commodities.

● Passenger Accommodations

Passenger accommodations consist of 24 spacious outside shelter deck staterooms suitable for accommodating 63 passengers. Two suites are available. All staterooms will be mechanically ventilated and steam heated. Furnishings will be modern in design and each stateroom will have an independent toilet and a shower with hot and cold fresh water and built-in wardrobe. Complete service, including hospital and dispensary, barber shop, laundry and a library will be available for all passengers.

Located on the main deck and extending the full beam of the ship, the passenger dining room will be reached by two staircases leading from the shelter deck entrance hall. A private dining room adjoins the main room and can be connected with it. The dining rooms will accommodate 80 persons at one sitting; will be air-conditioned and decorated with murals depicting scenes contiguous to the principal ports of call. Other murals of similar character will adorn the lounge and the entrance hall.

A cafe, with a dance floor and with bar and smoking rooms adjacent on the port and starboard sides respectively, will be located on the promenade (bridge) deck. A commodious lounge on the promenade deck will be reached by a grand staircase from the ship's entrance hall on the shelter deck. The forward end of the promenade deck will be glass enclosed. A salt water, open air swimming pool will be located on the boat deck just aft of the fidley.

Although of fire-proof construction, the vessels will be provided with the most modern equipment for fire detection, protection and extinguishment.

Wireless facilities of the latest design will be installed to permit communication with the home port or other stations at all times.

● Crew Quarters

Quarters for the master, deck officers and radio operators will be located on the boat deck aft of the wheelhouse, while those of the ship's doctor, purser, engineers, cadets, electricians, machinists and the stewards will be amidships on the main deck. Quarters of other members of the crew will be aft on the same deck.

Crew accommodations will be ample with at least 30 square feet of deck space to each man. These quarters will be mechanically ventilated and steam heated and the showers, bath and lavatories will be provided with hot and cold fresh water.

A large recreation room for the crew will be provided aft. The officers' mess, with recreation room adjoining, will be placed on the port side amidships and the crew's mess on the starboard side of the main deck. The petty officers' and stewards' mess also will be located amidships on this deck. Hospital facilities for the crew, with a capacity of six beds, will be provided.

The galley, pantry and bakery will be located on the main deck just aft of the main dining room. The equipment, the most modern obtainable, will be electrically operated. An ice water circulating system will be installed with outlets at convenient points for the passengers and the crew.

● Machinery

The main propelling unit of each ship will have a maximum capacity of 8,600 S.H.P. It will be General Electric, high speed, cross-compound, double reduction geared turbine, driving a single screw and ex-

(Page 53, please)

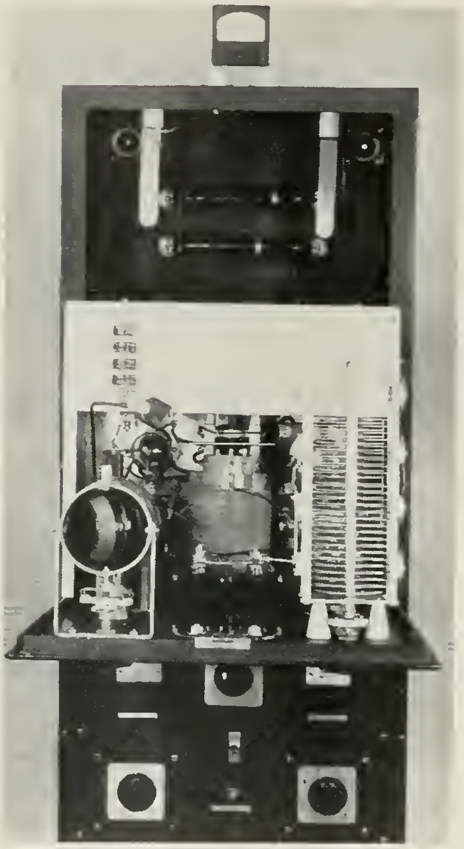
Globe Wireless Marine Transmitter

The San Francisco transmitting station, Mussel Rock, Calif.

There has been a bumper crop of treaties, international conventions, acts and regulations, which have virtually legislated a great proportion of present radio gear into obsolescence.

January, 1940, has been set as the deadline for installing modern tube transmitters and scrapping the "sparks," the familiar old black panels with the copper-ribbon "pancakes" above and the copper "accordion" below. An inherent characteristic of these old transmitters is that they create a maximum of interference, the signal occupying a wide space on the receiver dial. Modern tube transmitters, complying with the new regulations, are confined to only a small portion of the band required by the "ether-hog" spark sets. With more ships and more messages, there must be less interference—so the sparks must go.

Not only will sparks soon be obsolete, but also certain tube sets. They may lack a number of features, such as the necessary power or the frequency stability that the law requires. Frequency stability is that quality which makes the signal come in on the same dial setting of the receiver all the time. With the advent of the auto alarm this is of increasing importance, for the alarm receiver is pre-set to the distress wave. If its bell is to ring on the signal of the vessel in distress, that vessel must transmit on the distress wave; in other words, it must stay within its frequency tolerance. Distress is given only as an example; for the ordinary calling of a station, the frequency must be accurate or the signal may be unheard. Receivers are becoming more selective in tuning every year, in order to function properly through conditions of intense interference that now prevail.



The new Type 935 transmitter with front panel open.

Those shipowners who must replace their radio equipment with newer types now face a serious problem. Radio apparatus, due to its complexity, is inherently expensive, yet regardless of cost it may become obsolete before it wears out. The kernel of the situation, then, is to secure apparatus that meets all present legal requirements, and all of such future needs as can be foreseen.

At this time there are four principal guideposts:

1. The London Conference on Safety of Life at Sea.
2. The International Telecommunications Convention of Cairo.
3. The Inter-American Conference of Havana.
4. The Ship Radiotelegraph Safety Rules of the Federal Communications Commission.

The mandates of all of these overlap to a degree, but they are by no means identical. Any new equipment ought to meet the most exacting provisions of each of them, with a factor of safety to spare.

The nature of the radio art is such that regulation in minute detail is impossible; hence we find such all-inclusive phrases in the laws as "good engineering practice," "as quickly as possible," etc. New equipment should, therefore, do more than meet the law—it should also be well constructed electrically and mechanically, and designed with a common-sense appreciation of what ought to be necessary.

● New Globe Transmitter

With these factors in mind, Globe Wireless engineers have collaborated with Heintz and Kaufman, Ltd., manufacturers of the new Type 935 transmitter, in developing what they term as nearly "legislation-proof" radio apparatus as can be devised. In doing this, they have kept nine precepts constantly in mind:

1. Meet all laws with a safety factor.
2. Promote efficiency of the components and the unit as a whole.
3. Make all parts electrically oversize, as regards breakdown.
4. Make it simple to operate.
5. Make it easy to maintain.
6. Make it fool-proof.
7. Protect operating personnel from accidental shock.
8. Make it mechanically strong and resistant to weather.

San Francisco firm announces that type-approval has been granted by the Federal Communications Commission of its latest marine transmitter designed to meet all current laws, rules and regulations.

The Manila transmitting station at San Juan, P. I.

9. Keep sales price to minimum consistent with the best engineering practice.

The outgrowth of this research is the Heintz and Kaufman Type 935 main and emergency marine radio transmitter. Although rated at 200 watts output, it developed about 300 watts on test and can be increased considerably above this power if required by legislation or if desired by the owner. It transmits on continuous wave (A1 emission) and interrupted continuous wave (A2 emission). It operates on six intermediate frequencies or wavelengths, including the distress frequency (500 kilocycles). The frequencies are controlled by means of a piezo-electric quartz crystal, universally acknowledged to be the most effective frequency-control device. The frequency stability is well within the one-tenth of one per cent contemplated by the Havana Conference (5 times as narrow as present requirements). Inasmuch as the piezo-electric crystal yields the highest quality of frequency control yet known to the art, any future legislation to further narrow the tolerance may be discounted.

Jack Kaufman, executive vice-president of Globe Wireless, states that the Type 935 transmitter is considered the outstanding marine radio development of recent years. He stresses a number of features: the crystal control eliminates possibility of "off-frequency" reports, materially reduces servicing and inspection time in port and renders a wavemeter unnecessary; the transmitter proper is assembled on a hinged panel which automatically disconnects all voltages when opened, rendering it accessible and safe; it is simple of operation and maintenance; if desired, the shipowner may, in many cases, reduce costs by using presently installed radio generators as the power supply; tubes are oversize, resulting in greatly increased life and reduced tube cost; the chassis, spare parts and wiring diagrams are prominently labeled with identical symbols to facilitate repair and installation of spares; and the transmitter is efficient, compact and rugged.

Portion of operating room, San Francisco central traffic department.

● Heintz and Kaufman Radio Pioneers

Heintz and Kaufman are pioneers in marine radio. They are manufacturers of the MC-201 transmitters which were among the first high frequency marine transmitters in service. These are operated as the main transmitters of all vessels under the flag of the American President Lines. These transmitters established records of communication with San Francisco direct daily around the world.

● Other Globe Activities

The activities of Globe Wireless include operations in both point-to-point and marine radio. Offices and stations engaged in both classes of service are located in San Francisco, Honolulu, Manila, Guam, New York, Chicago, Seattle, Los Angeles and Shanghai. From these terminals they connect with foreign carriers for transmission to all countries having radio or telegraph facilities, and in the United States they connect with the domestic telegraph systems.

It is pointed out that the Globe stations are strategically located to give complete communication coverage on the Pacific. No other system has as many marine stations in this area.

In the marine field, Globe Wireless is in the business of communication with ships, sale and rental of marine radio equipment, (they are exclusive marine agents for Heintz and Kaufman Ltd.), installation and maintenance of shipboard radio apparatus, and the furnishing of executive, administrative and miscellaneous radio services. They offer complete service in marine radiotelegraph affairs.

Globe Wireless alone offers an additional marine service, furnishing ship position reports free of charge to newspapers of general circulation. These are published in certain newspapers in San Francisco, Los Angeles, Seattle, San Diego, Honolulu and Manila.

The sidewise launching of the two cutters created some stir in Saginaw Bay.

TWO NEW ICE-BREAKING HARBOR CUTTERS

The identical 110 ft. Coast Guard Cutters Raritan and Naugatuck began their designed career of disciplined service at the plant of the Defoe Boat & Motor Works March 23 by descending the launching ways in twin formation. Ropes were cut simultaneously on both ships and they struck the water about a second and a half apart, heeling spectacularly to 60 degrees as they did so and dipping up tons of water which spurted from the freeing ports in their bulwarks as they righted.

The ships are harbor cutters, one to be stationed at Boston and the other at Philadelphia, and are of the following general characteristics:

Length overall	110 ft.
Beam, molded	26 ft. 5 inches
Depth	14 ft. 11⅝ in.
Draft, maximum	10 ft. 6 in.
Displacement at 10′ 6″ draft	328 tons
Shaft horsepower	1000
Speed, cruising	12 knots
Cruising radius at most economical speed	1800 miles
Fuel oil capacity, 2 bunkers	8140 gal. full
Fresh water capacity	1738 gal. full

Each is equipped with General Motors — Westinghouse diesel-electric main power plant, delivering 1000 shaft horsepower, and with its Baltic type bow and heavy waterline plating is capable of heavy ice breaking. Each is built to accomodate a complement of 2 officers and 14 enlisted men.

Fire fighting equipment consists of a 1200 G. P. M. pump, clutch-connected to the 90 H.P. auxiliary, operating through four 2½″ hose connections at a pressure of 75 lb., which is sufficient capacity to make these effective fire tugs.

The entire hull and house structures are electric welded. Pilot house front is made of manganese silicon bronze which is electric arc welded to steel structure. House portlights—there are no portlights in the hull—are monel metal similarly are welded to the house sides. Monel button type floor plates are also welded to steel in galley and toilets and are used for treads at doors to deck.

Radio sending and receiving equipment is sufficient only to keep ship in touch with its shore station.

Deck equipment includes two 25-person and two 10-person life rafts and one 20 ft. motor launch with standard davit equipment.

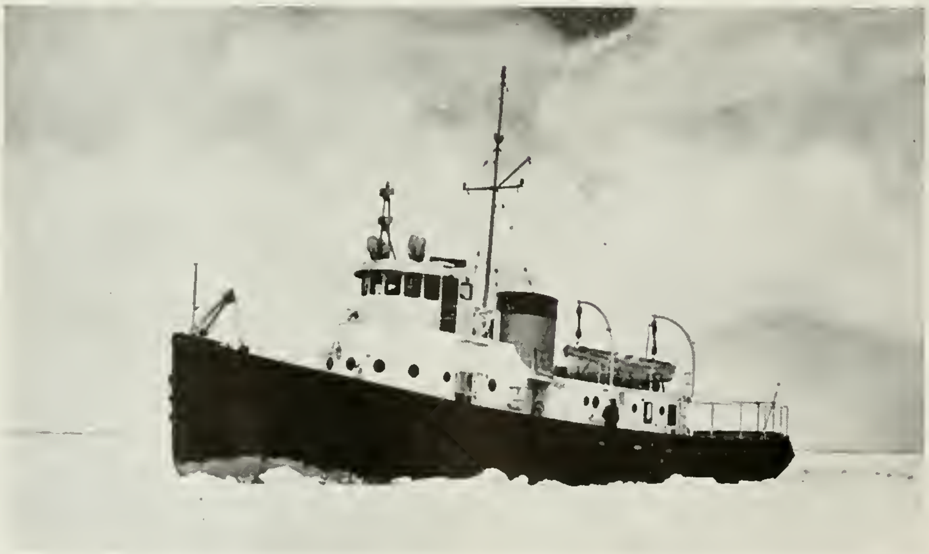
Speed developed on trials was 13.1 knots maximum at 265 r.p.m. of propeller and 1010 H.P. of engines.

● Propulsion Machinery

These harbor cutters are for use as boarding tugs and for ice breaking in harbors, rivers, sounds and bays. For the first mentioned duty, 800 SHP at 250 r.p.m. is required at the propeller shaft, and for the second duty 1000 SHP at 235 r.p.m. Diesel-electric drive provides the flexibility in maneuvering required. Operation of the vessels may be controlled either from the pilot house or engine room.

Power for the propulsion motor in each cutter is obtained from two General Motors Model 8-567, 2-cycle diesel engines, each rated 640 H.P. at 750 r.p.m., direct-connected to Westinghouse direct-current generators, each rated 400 K.W. 250 volt at 750 r.p.m. Each engine also drives an exciter generator by a V-belt connection. For normal cruising both main engines are used, while only one is required for low speed work. Connections between the two generators and the propelling motor, rated 1000 S.H.P. 250 volt at 234 r.p.m., are made through switches on the switch panel mounted on each generator. All generators and motors, together with their control equipment, were manufactured and supplied by the Westinghouse Electric and Manufacturing Company.

Installed in each vessel for auxiliary power is a General Motors Model 6-71, 2-cycle diesel engine, rated 90 H.P. at 1200 r.p.m., direct-connected to a 30 K.W. generator, and a Worthington clutch-driven 1200 GPM, 75 lb. pressure fire pump.



Naugatuck plowing through 14-inch ice in Saginaw Bay on her trial trip.

Raritan and Naugatuck have unexpected opportunity on their official trial trips to demonstrate their remarkable ability to break through thick ice.

Straight and true, at more than half speed, the Raritan leads a tanker through 12-inch ice.

This set, as well as the auxiliary generators driven by the main engines, can be used for supplying current for the ship's auxiliaries, electric lighting circuits, and electric galley. Equipment also includes a 15 K.W. motor generator stand-by set for port use.

Propeller speeds up to 200 r.p.m. are obtained in the first six controller positions with the engines operating at half speed. Higher speeds up to full power are obtained by increased engine speeds and variations of motor field current over the remaining five steps.

Lubricating oil purifiers are the "Hydroil" type, supplied by Gould Pumps Inc.

The Lux CO_2 system of fire extinguishing covers the machinery spaces, and, together with the liberal supply portable extinguishers, was supplied by Walter Kidde & Company, Inc.

Sandusky Foundry & Machinery Co. cast and machined the brass sleeves for the tail shafts.

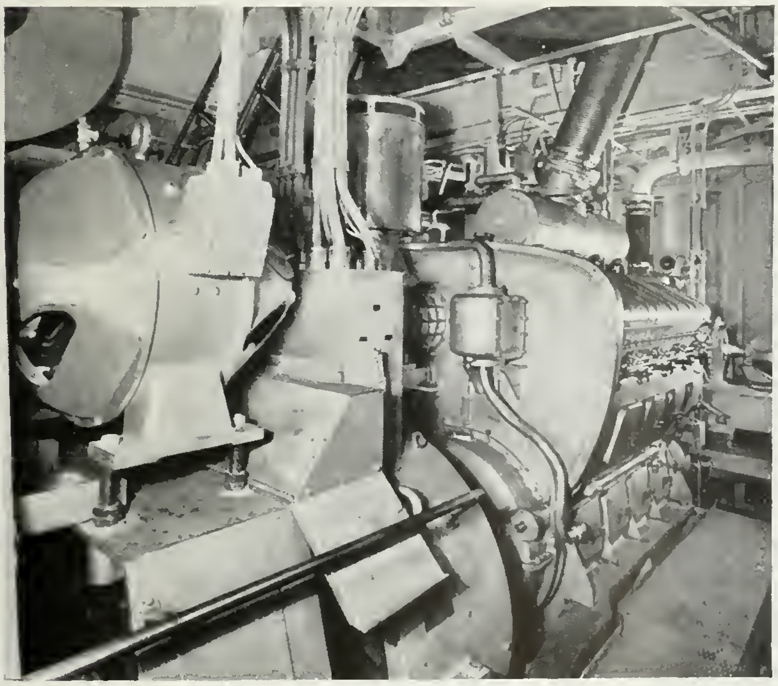
In the crew and officers' accommodations considerable quantities of linoleum, linotile, and cork insulation were installed by the Armstrong Cork Company.

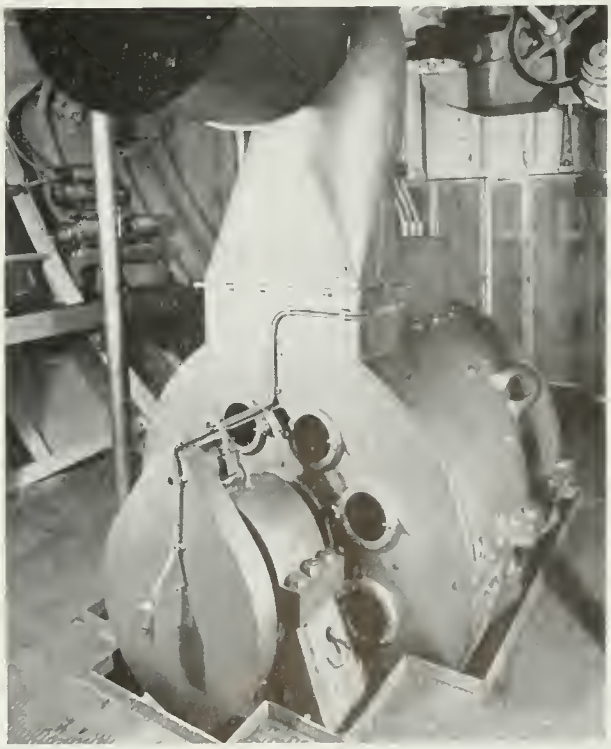
The electric fans were supplied by the Diehl Manufacturing Company.

● Trial Trips

Dame Fortune provided for the two days of the trials a practically perfect ice test for the ships, which had not been hoped for. The Naugatuck, out for trials on Saginaw Bay, discovered that two oil tankers of the Great Lakes Transport Company were helplessly locked in a field of solid green ice 12 to 14 inches thick. She made short work of breaking them through the six-mile-wide barrier. The following day, at the request of the owners of the tankers, the Raritan on her trials led them both out again through the field.

This ice test was illuminating. Either ship found it possible to run through the ice at 7 to 8 miles per hour, and maintain almost perfect steerage all the time. On several occasions the ship was stopped in the ice to let photographers climb overboard, and each time started ahead from its stopped position without having to back and fill once. The ships do not rise at the bow but gradually creep upon the ice until the whole weight of the ship breaks





Above: General Motors-Westinghouse diesel generating set.
Right: Westinghouse propulsion motor.

it down. The wake left is clean and smooth, as shown in the illustration. Just the neat width of the ship, which indicates concentration of the ice-breaking power within the width of the ship's beam, no power being wasted on the ice to either hand. At any time during the ice breaking the ship could be stopped and men could step off on solid ice right against the ship's side, no ladder or gang plank once being used for the purpose.

This unexpected and unplanned ice test was highly satisfactory to Coast Guard officials and the two little ships began their careers very properly and spectacularly by saving several days of delay and possible mechanical damage to shipping.

Trade Literature and Trade Notes

Micromax Frequency Controller, an 8-page booklet designated as Catalog N-56-161 (1), and published by Leeds and Northrup Company.

This brochure describes a new Micromax frequency controller, industrial type, which provides isolated generating plants with the automatic control of frequency which heretofore has been thought feasible only for large central stations on interconnected systems.

In one compact case is combined the well-known Micromax frequency indicator and recorder with an automatic controller, a simple, relatively inexpensive arrangement which omits the refinements necessary for large central stations on interconnected systems.

The Midget Marvel Flexarc a-c welder, comprising a special transformer and control for a-c arc welding and meeting the demand for an economical low-priced welder for all-around maintenance and shop work, as well as light construction work, is described in a new leaflet released by the Westinghouse Electric & Manufacturing Company and designated as Descriptive Data 26-320.

The welders may be used on hundreds of welding jobs, such as metal furniture, cast-iron furnaces, auto frames, fenders or bodies, broken cast gears and machine parts. They are particularly adaptable to the diversified demands of such shops as those engaged in automobile service, blacksmithing, and light structural steel fabrication.

Specifications for the welder are: current range, 30-140 amperes; coated-electrode capacity, 1/16 inch to 5/32 inch diameter; current adjustment, 12 steps; frequency, 60 cycles; secondary open-circuit voltage, 50 volts on low range, 55 volts on high range; overall height, 14¼ inches; overall length, 17⅞ inches; overall depth, 10¾ inches; weight, 112 pounds.

Compressed Air Receivers

The complete line of twenty-three standard air-receivers manufactured by Ingersoll-Rand is described in a new folder just announced by the manufacturer as ready for distribution.

These receivers are available for maximum pressures of 125, 250, 350 and 500 lbs. In addition to the standard sizes, receivers to meet special conditions, or in considerably larger sizes, are built on special order. All receivers are inspected and stamped by A.S.M.E. National Board Inspectors.

Inspection certificates are filed with the proper authorities as may be required by law. A copy of the inspection certificate is sent to the customer so that it is available for insurance purposes.

It is pointed out in the folder that every compressor should have adequate receiver volume in order to reduce pipe-line pulsations, provide momentary reserve capacity, remove moisture and oil vapor, and assist in regulation of compressor capacity.

Copies of this folder (Form 9262) are available from the Ingersoll-Rand Company or from Pacific Marine Review.

Covic Marine Diesel Engines: Complete information on the Covic Diesel marine engines now in production in America is included in this attractive new catalog issued by the Covic Diesel Division of the Northill Company, Inc., of Los Angeles.

The new catalog gives installation and performance data on Covic Diesels for main power in boats up to 30′, as auxiliaries in 50′ sail boats and as complete generator sets. They are available in 2:1 and 3:1 reduction gear models.

The Covic is a full diesel of 20 H.P. with two opposed cylinders, and is of unusually light weight and small size.

Copies of any of the above circulars are obtainable on request through the Pacific Marine Review, 500 Sansome Street, San Francisco, Calif.

- **General Motors Pacific Coast Sales and Service**

One of this year's most important bits of news in industrial equipment circles, and one which will undoubtedly be of interest in marine circles, is contained in the announcement by General Motors Corporation of the opening in Los Angeles and San Francisco of centralized facilities for sales and service of the new General Motors industrial line of diesel engines.

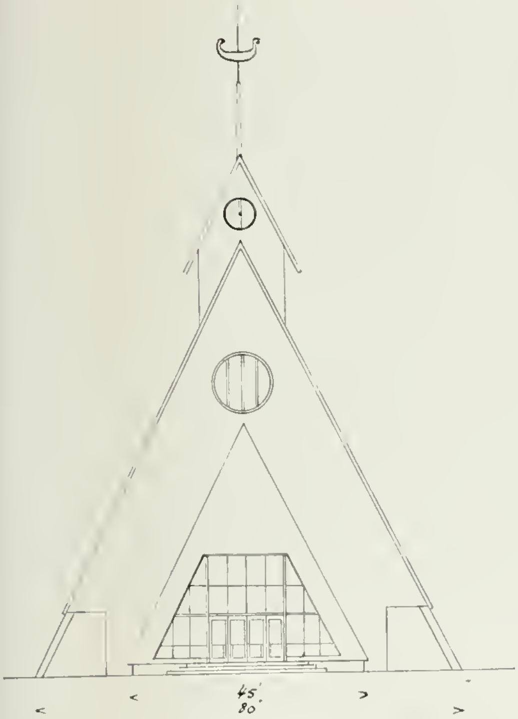
Headquarters for General Motors diesel equipment in Southern California, Arizona and Southern Nevada will be centered in the organization of the Beeson Engineering Company, who have been appointed exclusive distributors for that area and have opened commodious general offices, warehouse and service facilities at 333 W. Washington Blvd., in Los Angeles.

Northern California distribution will be handled by the Moore Equipment Company, 525-4th St., San Francisco, who will maintain branches in both Oakland and Stockton.

The Beeson Engineering Company has installed at its Los Angeles headquarters General Motors diesel equipment and generator plant to supply its own heating and lighting and power for service department machinery. Actual testing and observation of these units will supply necessary data for the computation of actual electrical generation costs and should furnish interesting statistics for prospective users of diesel power plants.

Save the Gjöa Foundation

Formed by Patriotic Citizens to Preserve the Famous Ship of Roald Amundsen for Posterity



End view of proposed Gjoa house.

To make the Northwest Passage from the Atlantic to the Pacific was the ambition of every world explorer from the time of Columbus for four hundred years, and many notable attempts were made. It was reserved for that great Norse scientist and daring seaman, Captain Roald Amundsen, and his sloop "Gjoa" to complete this great achievement, arriving at San Francisco in October, 1906.

San Francisco, just then beginning to arise from her ashes, nevertheless took the daring seaman to her hero-loving heart and gave him a great reception. The Gjoa was laid up at Mare Island and Captain Amundsen and his crew went home to Norway.

In June, 1909, the Gjoa was put in shipshape condition and presented to the Park Commission of San Francisco to be placed in Golden Gate Park near the ocean beach as a gift from Roald Amundsen, the Norwegian Government and the Norwegian people of the Pacific Coast. On Monday, July 5, of that year a great throng of San Francisco citizens saw her hauled up on the beach as part of the Fourth of July celebration.

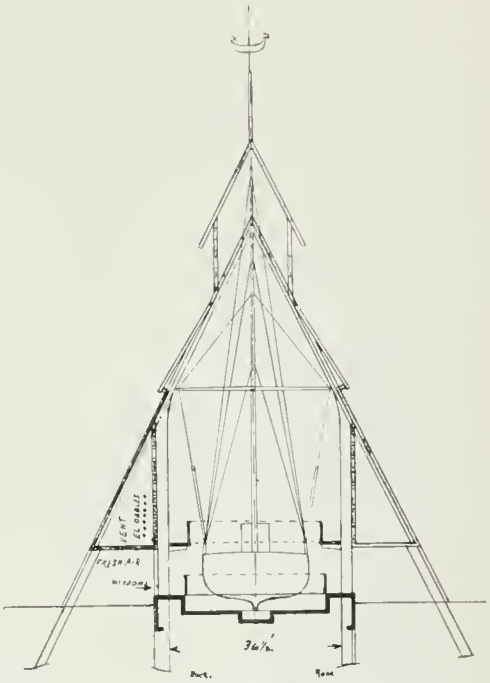
She was placed in the park and for thirty years has faced the broad Pacific, a monument to her daring commander and an inspiring source of awe and wonder to every sea lover.

Thirty years of exposure to the elements have taken their toll, and after survey the old ship is found to be in rather precarious condition. The Park Commission has included an item for rehabilitation in its 1939-1940 budget and it is hoped that the mayor and board of supervisors will make the necessary appropriations.

To preserve this fine old ship after rehabilitation, the "Gjoa Foundation" has been established by interested San Francisco citizens, including among its founder members and sponsors:

Charles R. Page, president, Fireman's Fund Insurance Company; Dr. Val C. Holmer; J. J. Hunter, president, Bank of California; Roger D. Lapham, chairman, American-Hawaiian Steamship Company; Dr. Frederick C. Cordes; Sidney W. Ford; Chalmers G. Graham, admiralty attorney; Albert M. Bender; Edward Gunderson; Fred Olsen Line; Interocean Line; Alfred Abrahamsen; and the Norwegian Club of San Francisco.

This foundation has very sensibly adopted as its objective the raising of sufficient funds to properly house the Gjoa in a building of Norwegian type architecture and with its interior arranged for display of the ship without any liability of damage to hull or equipment.



Transverse section through proposed Gjoa house.

The illustrations herewith show in outline the proposed building.

This project should receive generous support from all lovers of San Francisco. There is only one Gjoa in the world. Her achievement was unique. She should be preserved, and this plan presents the only method by which that preservation can be accomplished at low cost and with no sacrifice of her mission as a monument to science and seamanship.

All parties interested in this foundation should communicate with its secretary-treasurer, Erik Krag, vice president, Interocean Steamship Corp., San Francisco, California.

Metalumber

SAFETY HATCH COVERS

Lightweight, Fire-Resistant, Interchangeable, Interlocking Cover Boards for Hatch Openings

Metalumber Safety Hatch Covers are easily handled and are interchangeable.

The trend of modern thought, the rules of all controlling Government agencies, and the temper of the traveling public all alike demand "Safety at Sea." Naval architects, marine engineers, shipowners, classification societies, and shipboard personnel are all cooperating to give first consideration to safety in the design, construction and operation of ships.

The Metal Lumber Corporation of New Jersey, after considerable research and design work, is offering a successful and an economic solution for one of the most pressing safety problems on shipboard—the covering of hatch openings.

Fully 25 per cent of the deck area of the average vessel consists of hatch openings. The usual practice is to surround these openings with heavy combings into which heavy steel beams or strongbacks are fitted, and on these strongbacks are laid wooden hatch boards forming a reasonably closed surface strong enough to support considerable weights but not tight enough to exclude water and very vulnerable to fire. On the weather decks these hatch boards are covered by water tight tarpaulins secured in weather tight fashion to the outside of the hatch combing. Such hatch covers form floodable hazards in heavy weather when tarpaulins are carried away.

The problem was to replace these wooden hatch boards with a substitute that would be: fire retardant; fairly water tight; of equal or greater strength; of comparatively low overall cost; and identical in form and dimensions so that no change need be made in hatch structures.

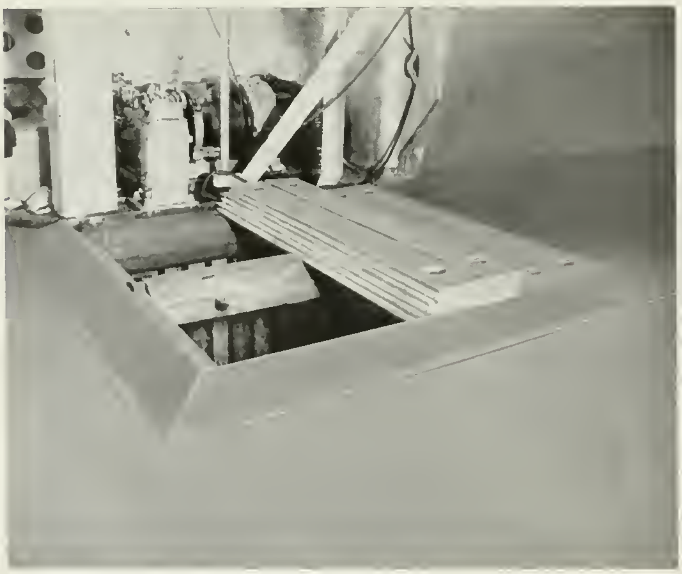
The solution offered is an all welded, all metal hatch board which has been named "Fire Retardant Safety Hatch Cover."

This is made in three types:

(1) Open bottom type, where lower original cost and lightness are desired.

(2) Plain side type, a full box section filled with fire retardant material, exact duplicates in size and shape of the prevailing type of wood plank.

(3) Interlocking type; this type is grooved on one side and tongued on opposite side, has the same dimensions as the wooden cover and



Metalumber hatch boards pile neatly and stay piled.

is filled with fire retardant material.

If the tarpaulins were carried away with the interlocking cover, it would be impossible for enough water to pass through this hatch to endanger the vessel.

The following advantages are claimed for this hatch cover:

(1) It is highly fire resistant;

(2) It has a very high weight supporting capacity;

(3) It is easily maintained and readily replacable;

(4) It is light in weight and easily handled;

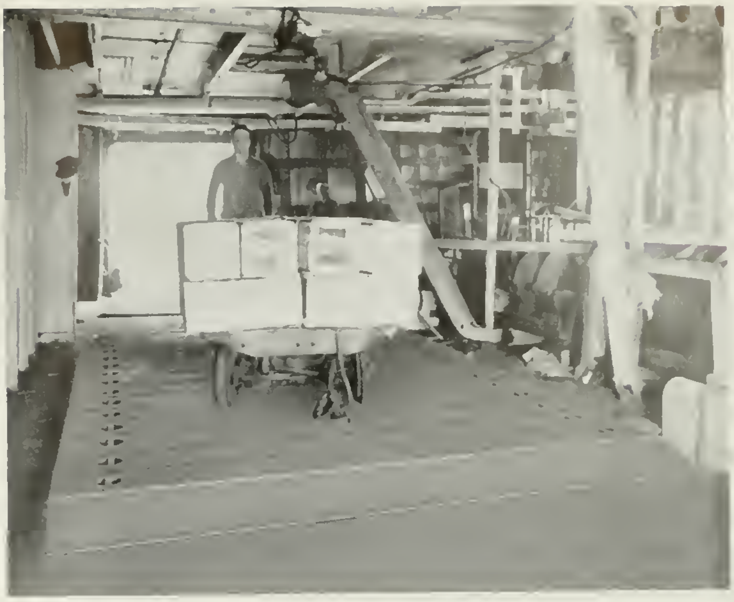
(5) It cannot be floated out of place;

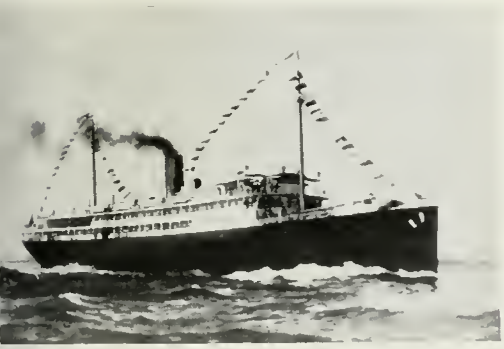
(6) It has a low overall cost and no installation cost;

(7) And it is of very rugged construction and highly resistant to deformation or damage.

The operators of ships equipped with "Fire Retardant Safety Hatch Covers" testify that these covers will outwear wooden boards by at least four to one, so that hatch cover expense is greatly reduced. These operators also testify that the use of these metal covers greatly reduces tarpaulin costs.

These economy features, together with the added and much more important safety element, should commend this hatch cover to every shipowner.





Above: Metalumber Hatch Covers form a smooth surface on which to handle cargo. At right: The Grace liners Santa Paula, Santa Rosa and Santa Elena are equipped with Metalumber Covers. At left, upper: The Savannah liners City of Birmingham and City of Chattanooga use these covers. Lower: The Clyde Mallory liners Shawnee, Cherokee and others are likewise equipped.

MARINE FIRE PROTECTION

The annual convention of the National Fire Protection Association (N.F.P.A.) will be held at the Stevens Hotel in Chicago from May 8 to 11, 1939.

The United States Bureau of Marine Inspection & Navigation, using as a basis much of the material worked out by the Marine Section, N.F.P.A., regarding fire protection, approaches completion of new General Rules and Regulations.

The Marine Section was organized in 1920 as the Marine Committee of the N.F.P.A. Pioneering in development of fire protection for all kinds of craft, from small motorboats to ocean liners, this work was purely voluntary and had the cooperation and participation of ship operators, builders, and the United States Steamboat Inspection Service. By 1933 the activities of the Marine Committee had expanded to a point warranting formation of the present Marine Section, which has since held its own meetings at the annual convention.

This year the Marine Section, under the guidance of S. D. McComb, its chairman, offers an interesting program of addresses, reports and discussions, beginning at 2 P.M., May 8, and including:

Address: "Safety Features in New Vessels Under the Construction Program of the Maritime Commission," Commander H. L. Vickery, assistant to the chairman, United States Maritime Commission.

Address: "Tanker Safety," Robert E. Coombs, principal traveling inspector, Bureau of Marine Inspection and Navigation.

Address: "Fire Prevention Aboard Passenger Vessels in the Great Lakes," W. B. Mayo, president, Chicago, Duluth and Georgian Bay Transit Company.

STEADY AS YOU GO!

(Continued from page 31)

frequently force ships to keep the ventilator cowls closed for days.

The dew point of the atmosphere has fallen considerably and may be assumed to be 45 degrees, the temperature of air to be 50 degrees and the relative humidity 82 per cent. The sea-water temperature is also assumed to be 50 degrees. The cargo near the sides of the ship and the surface layer has probably cooled off somewhat due to the influence of the cooler sea water and atmosphere; but the inside of the cargo block is as warm as it was at the time of loading. Spontaneous heating may have raised the temperature inside even higher.

It is certain that the vapor pressure in the interior of the cargo block is materially higher than in the cool atmosphere. This will cause an accelerated transfer of moisture from the hot inside to the ventilating air and to the cold sides of the cargo hold. The exhaust air may be assumed to have a dew point of 65 degrees. The temperature of the atmosphere is 15 degrees lower than this dew point. The exhaust ventilator is exposed to the cool atmosphere from the outside and to the warm exhaust air from the inside, with the result that the temperature of the ventilator will be about 55 degrees. As a result, some of the exhaust air is cooled below its dew point and moisture condenses in the ventilator shaft, coursing down its walls and dripping on the cargo or protective matting underneath. Part of the exhaust air will not be cooled and will escape with its load of moisture originating from the cargo.

Much moisture is condensing at the same time under the decks and on the sides of the hold, which are exposed to cold wind and water, whence it will run into the bilges. The condensing effect will be greatest below the waterline, because heat is transferred roughly about 100 times faster from the inside through the hull to the sea water than to the atmosphere, approximately 2.3 B.t.u. vs. 240 B.t.u. per square foot per degree F. per hour.

The result of this powerful condensation effect is that but little moisture will actually escape from the hold, in spite of the great difference in vapor pressures between cargo and atmosphere. The condensation in the exhaust ventilators could be lessened by insulating them, thus roughly doubling the amount of moisture that could be removed from the cargo, which is not much to begin with, provided, of course, that bad weather or wrong trimming of cowls do not interfere with the natural ventilation. Nevertheless, the amount of moisture that can be removed from the cargo under such improved conditions would probably not exceed 600 pounds of moisture per 24 hours.

The staggering amount of moisture that condenses in cargo holds carrying rice is illustrated by the statement of the first officer of one of the ships in this trade: "Whenever the ships get in cool weather I sound the bilges regularly. If the water rises in the bilges, I know that moisture is condensing in the hold." He noticed this condition whether or not the natural ventilation of holds was interrupted due to bad weather. This statement leads to the conclusion that more than one ton of moisture may condense in a single hold within 24 hours under the conditions as set forth above.

The above example indicates how the effects of ventilation in cargo holds can be approached by calculations. Furthermore, it proves that the prevention of overhead deck and ship's side condensation by means of natural ventilation must not be overestimated. Similarly, the interruption of natural ventilation because of bad weather should not be overestimated as cause of damage to cargo.

● Spontaneous Heating and Natural Ventilation

The amount of moisture to be removed from a large parcel of damp cargo, with the addition of a substantial heat load, is much too great to be taken care of by natural ventilation of holds, as it is done today. Undoubtedly the same statement is true for cargoes liable to ignite spontaneously, such as copra or fishmeal. Not enough data are available at present on which to base calculations of the amount of heat released by a parcel of such goods under given conditions of moisture content and oil content. But it is believed that a very much greater cooling and drying effect will be required for their safe carriage than can be produced by natural ventilation methods, or that means should be provided to prevent access of oxygen to the cargo.

The ventilation of holds is undoubtedly helpful in removing odors, gases and fumes from cargo holds. There are numerous chemicals, filters and electric apparatus available on the market with which to destroy one or the other of the above. Undoubtedly some of these are useful in dealing with specific cargoes and moderate conditions. It appears, however, that ventilation with a sufficient amount of air is going to remain by far the cheapest and most efficient method for removing odors and fumes.

Questions Answered by the Chief

(Continued from page 29)

in port. Note the three stages of bleeding for water heating. This diagram indicates reciprocating and turbine pumps non-condensing, if used for purposes not associated with propulsion, such as fire pumps, cargo or emergency uses. This method permits the generation of auxiliary power at the main unit efficency, thus accomplishing the first improvement discussed. Then by reducing to a minimum the high pressure steam to units other than main propulsion, and heating the feed from steam extracted from the main unit instead of exhaust from auxiliaries, the second or thermodynamic improvement is realized.

Briefly, to reduce fuel requirements of auxiliaries we may better the efficiency of the auxiliary engines or eliminate them, or we may improve the steam conditions, or both.

This will be discussed in more detail in a future article under the general subject of thermodynamics.

Our next article will discuss thrust bearings.

A Latex Binder Covering for Ship Surfaces

American President Lines round the world liner President Adams uses Dex-O-Tex for weather decks.

A new plastic composition that solves many marine construction and maintenance problems has recently been made available in America under the trade name Dex-O-Tex.

This trade name covers the use of pure rubber latex as a binder in cold mixes of various aggregates to make resilient, water tight, self-adherent, surface coverings for interior or exterior floors, decks, walls, bulkheads, or any structural areas needing such protection and is ready for traffic in 8 to 10 hours.

Dex-O-Tex is manufactured in the United States by the Crossfield Products Corporation, whose home office and manufacturing plant is at Los Angeles, California, and who operate an Atlantic Coast factory at Brooklyn, N. Y.

The various combinations manufactured under this trade name have many valuable properties for and manifold uses in the shipbuilding, ship maintenance and ship industries. Their use aboard ship is fully approved by the controlling Federal agencies and by the classification societies.

The advantages to be derived from the use of this product on shipboard lie in the following qualities:

(1) It has practically perfect adhesion without the use of any type of anchor.

Numerous tests by the U. S. Bureau of Standards and others show a bonding strength with wood or metal averaging approximately 100 pounds per square inch. This bonding ability makes Dex-O-Tex a perfect underlay for tiling or even for wooden decks without other fastenings.

(2) It is light in weight.

The actual weight depends on the type of aggregate used and the thickness of the coating applied. The average for a 3/8-inch coating is 2.8 pounds per square foot. Comparison of weight with bonding power (1) above indicates that on vertical surfaces any desirable thickness may be applied without straining the bond. This quality of lightness is very important in shipwork, particularly as applied to weather decking and locations high up in the superstructure.

(3) It is resilient.

All ship's structures "work" in a seaway and under the stress of heavy weather this working movement in plates, frames and stiffeners may become comparatively large. Dex-O-Tex has resilience sufficient to accommodate itself to this movement and maintain perfectly its anchoring bond and its absolutely water-tight integrity.

(4) It has valuable deadening qualities for sound and heat insulation.

In some applications aboard ship this property is very essential, as, for instance, on bulkheads, the shell of a ship in quarters, under fans, or on light partitions between cabins.

(5) It is applied cold.

This property eliminates the disagreeable and costly use of heating equipment and its transportation to and placement on the ship being serviced.

(6) It is waterproof and definitely anti-corrosive.

A metal surface once covered by this material is safe from the ravages of corrosion, both chemical and electrolytic.

This product, under the trade name "Aranbee," is widely and favorably known in European ship yards and is in use on such famous vessels as Queen Mary, Normandie, and the new Queen Elizabeth.

First use of Dex-O-Tex in the American Merchant Marine was on the reconditioning of the American President Round the World and transpacific liners President Adams, President Harrison, President Polk, President Garfield, President Cleveland and President Pierce. On these ships this material was applied as covering for the boat deck, poop deck pilot house top and on the decks around hatches to refrigerated cargo spaces.

So impressed were the experts of the Maritime Commission with these installations and the tests of the material that they specified this type of Latex Deck covering for many applications on the C-3 type vessels and used this product as an underlay for the tiling of the swimming pools and bath rooms on the steamers Brazil and Argentina of the American Republics Line.

The Crossfield Products Corporation has appointed the L. S. Case Company of San Francisco as a licensed applicator of Dex-O-Tex. This firm have a long experience as weather deck experts serving Pacific Coast shipowners. They are enthusiastic on the wonderful properties of this new material and are recommending its use to their many clients. A recent installation covered the weather deck of the Matson steamers Manoa and Maui.

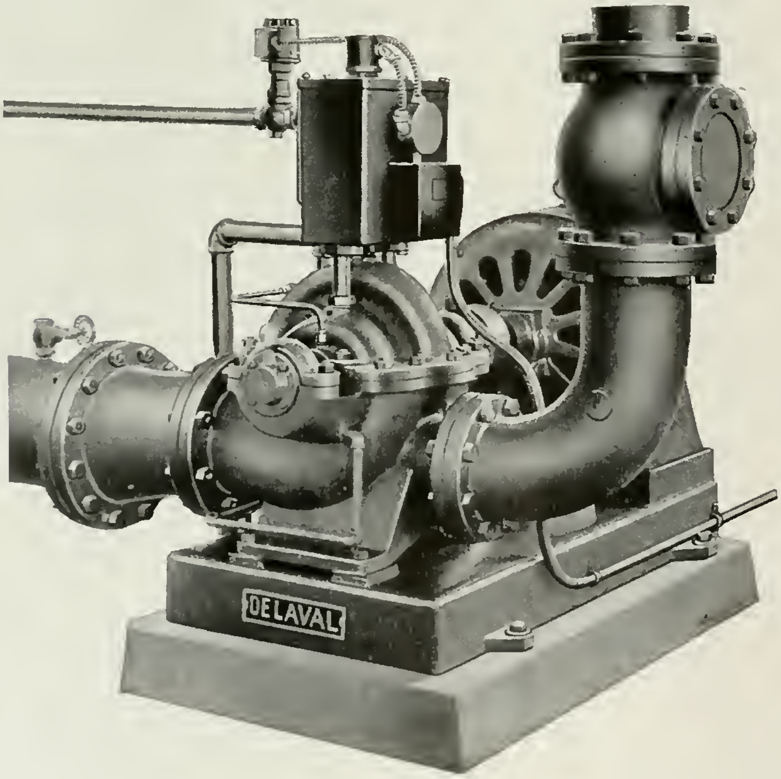
All Dex-O-Tex deck surface mixes are non-slippery wheher wet or dry. non-slippery whether wet or dry. And all mixes may be finished with a troweled, a buffed or a polished surface and may be installed in any color for inside or outside exposure, with a mineral filler or a cork filler.

Priming Equipment
For Submerged Suction Centrifugal Pumps

The starting and operation of centrifugal pumps would be greatly simplified if such pumps could always be located sufficiently below the source of supply so that they would fill by gravity, with only a simple air vent. Except in a few cases this is not practicable, by reason of natural grades, cost and difficulty of building and waterproofing underground pits, either dry or wet, difficulty in keeping dry pits drained, danger of wet pits filling up, and the difficulty in upkeep of a submerged pump. It is generally necessary, therefore, to locate the pump above the source of supply, which, while it facilitates overhauling and maintenance, introduces the problem of filling the pump with liquid before starting, keeping it filled, and insuring that priming, if lost, can promptly and certainly be reestablished and the pump put back into operation.

In the system herewith illustrated the water level on the suction side of the pump is automatically lifted above the eye of the impeller and continuously held there, just as if the pump were located below the supply. The expense and many difficulties of the deep pit usually required for submerged operation are avoided, while at the same time, merely by breaking the vacuum which maintains the elevated suction level, the pump can be drained completely and opened for upkeep and maintenance without further complication.

With this system, which has been developed by the De Laval Steam Turbine Co., Trenton, N. J., the water level in the suction space is raised above the center of the pump when the pump is initially put into service, which generally takes from one to five minutes, depending upon the length and size of the suction piping. Thereafter the entire suction line and the pump casing are normally kept full of fluid, so that discharge begins immediately the motor is started, while if for any reason the priming should be lost the pump motor is at once shut down until the water level has again been raised above the pump suction opening.



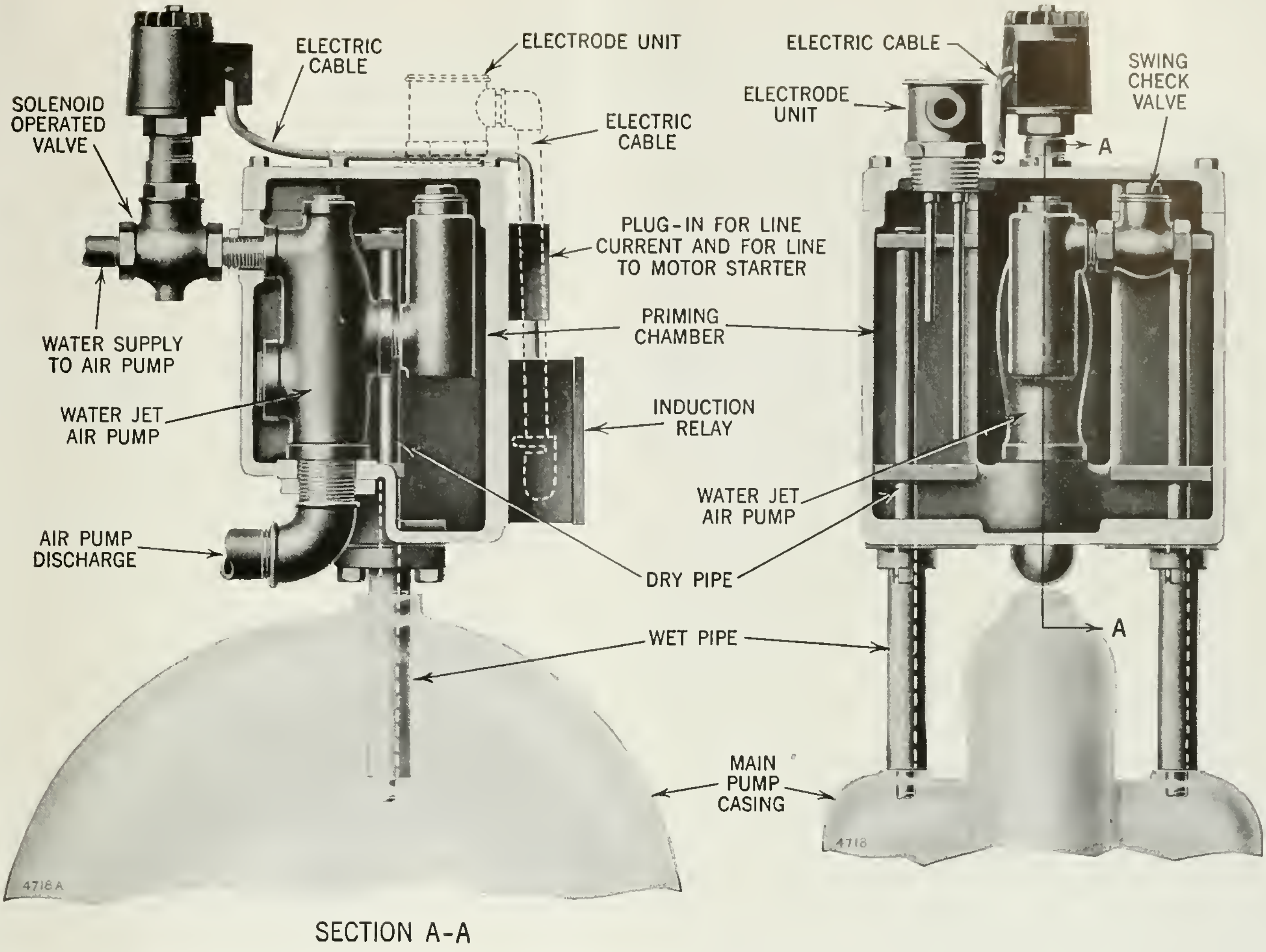
Pump fitted with submerged-suction priming system.

The application of this system does not affect the construction or normal operation of the pump itself, further than that each suction bell of the pump is arranged for the attachment of a pair of concentric pipes. The capacity-head characteristic, the efficiency, and the required horsepower of the pump remain unchanged and as before.

A priming chamber, mounted above and on the pump casing, contains, or is connected to, an air evacuating device, consisting ordinarily of a simple water, air or steam ejector drawing from the priming chamber through a check valve and discharging to waste at some convenient point. Two pairs of small pipes, one known as the "wet" pipe and the other (located inside the first pipe) as the "dry" pipe, connect the priming chamber to each of the suction bells of the pump. In addition to these parts, the pump discharge line has the usual check valve and gate or other shut-off valve.

When the ejector is started, air is withdrawn from the priming chamber, the pump casing and the suction line, and the water rises through the latter, filling the pump and eventually passing up through the wet pipe and rising in the priming chamber. The starting and stopping of the ejector is controlled by a valve operated by a solenoid energized from an electrical device which responds to the water level within the priming chamber, this same device also controlling the starting and stopping of the motor driving the main pump.

The governing impulses originate from two electrodes which enter



Submerged-suction priming system for centrifugal pump, showing ejector, electrodes, solenoid and relay.

through the top wall of the priming chamber with insulating bushings similar to spark plugs, and terminate at different levels in the priming chamber. The electrodes are connected to one terminal of the secondary circuit of a small A.C. transformer, the priming chamber itself being connected to the other terminal, while the circuits of which they form parts include a magnetic relay which is so arranged that the ejector will be started, and the pump motor prevented from operating, whenever the water level falls below the lower electrode, while the vacuum producer will be shut down and the pump permitted to operate when the water reaches the upper electrode.

Once the pump suction chamber has been filled with water, the impeller, when rotating, can overcome the static pressure of the discharge line and the pump may be started, kept in continuous operation, or stopped, as desired.

There is no danger of starting the pump prematurely or of running it after the suction has been lost.

In most cases, once the system has been primed, the water level in the priming chamber never falls below the lower electrode so long as the pump continues in operation, since most of the air in-leakage is carried through the pump with the water. Some may pass from the suction chamber up through the wet pipe to the vacuum space of the priming chamber, but up to a certain amount the pump can withdraw this incoming air through the dry pipe without bringing into action the eductor, which is called upon only to prime the pump initially and to maintain the elevated suction grade during intervals when the pump is shut down. After the initial evacuation of the suction line the eductor does not have to operate unless the pump is shut down for a considerable period, and then only for a few seconds at a time whenever in-leaking air accumulates in the priming chamber. This is an important feature.

Where the main pump can, without danger, be operated dry the De Laval submerged suction priming equipment may be arranged to prime the pump while running, requiring only a slight change in the electrical and sealing connections. In some cases, with belt or engine drive, or where for any other reason it is impracticable to shut the pump down on loss of priming water, De Laval pumps are so equipped that they can operate unprimed and without injury during the time required for the submerged-suction priming system to remove the air and to elevate the suction water level above the pump suction. This feature is valuable where the pumps are driven by synchronous motors with a limited "pull-in" torque, as the pump can be started with the casing air-filled and the submerged suction priming system put into operation by a suitable relay only after the driving motor is locked in synchronism.

On the Ways - SHIPS IN THE MAKING

LATEST NEWS FROM AMERICAN SHIPYARDS

Launchings, Deliveries, Contracts

Launchings in April

Airplane carrier **Wasp** for U. S. Navy from the Fore River yard of the Shipbuilding Division of the Bethlehem Steel Company at Quincy, Mass., on April 4.

C-2 standard diesel-drive cargo vessel **Donald McKay** from the Chester, Pa., yard of the Sun Shipbuilding and Dry Dock Co. on April 22 for the U. S. Maritime Commission.

1500 ton destroyer **Sims**, Hull No. 170, from the Bath, Maine, yard of the Bath Iron Works for the U. S. Navy, on April 8.

Navy defense features tanker Neosho from the Kearny, N. J., yard of the Federal Shipbuilding and Dry Dock Company for the Standard Oil Company of New Jersey on April 29.

April Deliveries

Navy defense features steam turbine drive tanker **Esso New Orleans** for the Standard Oil Company of New Jersey by the Sun Shipbuilding and Dry Dock Company on April 14.

Submarine **Saury** for the U. S. Navy by the Electric Boat Corporation, Groton, Conn., on April 3.

Steel derrick lighter Hull No. 194 for the U. S. Engineers Office, New York District, by the Maryland Dry Dock Company, Baltimore, Maryland.

Contracts in April

American Bridge Company, Pittsburgh, Pa. 15 double deck steel barges 198 feet x 35 feet x 11 feet, for the Mississippi Barge Lines Co. of St. Louis, Mo.

Mackay Gets Large Order

Mackay Radio and Telegraph Company announce that their associated company, Federal Telegraph Company of Newark, New Jersey, have been awarded an order by the Maritime Commission to supply all the radiotelegraph equipment and direction finders specified for thirty of the C-2 and C-3 vessels now under construction.

Each vessel is to be furnished with Mackay Radio type 150, 300 watt main intermediate frequency transmitter, type 151, 200 watt high frequency transmitter, type 149, 50 watt emergency transmitter, type 117 all wave receiver, type 101 auto alarm and type 106 radio direction finder.

This equipment will enable each vessel to maintain radio communication with its home port from all parts of the world, and is especially

OFF TO SEA AGAIN

These two pictures show the U. S. Army transport Hunter Liggett (formerly the Munson liner Pan America) leaving the Robins plant of the Todd Shipyards Corporation at Erie Basin, New York, on April 5 for the U. S. Army base at Brooklyn. During March she was converted by the Robins plant, the work including the installation of accommodations for 725 troops; cost $170,000.

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designed to comply with the regulations of the Federal Communications Commission, the Convention for the Safety of Life at Sea and all International treaties.

DELTA LINERS

(Continued from page 39)

hausting to a condenser, mounted athwartship beneath the low pressure turbine exhaust nozzle.

Two Babcock and Wilcox water tube boilers burning oil under forced draft will supply the steam at a superheater outlet pressure of 450 pounds per square inch and a temperature of 750 degrees Fahrenheit.

Two turbo generators will provide the necessary electrical energy. While at sea all of the continuously operated auxiliaries except the steam turbine driven boiler feed pump will be electrically operated. Deck machinery will be electrically driven and a diesel driven generator, located above the bulkhead deck, will feed the essential power and light circuits during emergencies.

Fuel oil will be carried in the double bottom tanks and in the four deep tanks forward of the boiler room. The fore and after peak, two wing and double bottom tanks in the engine room space will be used for fresh water.

Standard Distributing Company Now In Larger Quarters

With 8500 feet of floor space, the Standard Distributing Company is now occupying its modern new building at 271 Ninth Street in San Francisco. There is seventy-six-foot frontage on Ninth Street and one hundred and ten-foot depth in Clementina Street, greatly increasing the warehouse space, general offices and display rooms.

Established fifteen years ago, the heads of Standard Distributing Company are Louis Levin, partner and manager, and Carl Eddy, partner. This organization is exclusive San Francisco Bay distributor for Pabco marine paints. In the firm's new headquarters special care has been taken to provide parking spaces for customers. The new building has an ultra-modern "all glass" exterior.

The Motor Ship Reference Book for 1939: For more than 15 years "The Motor Ship Reference Book" has reflected the remarkable development of the marine diesel engine and the rapidly expanding industries that cover the building of motorships.

The 1939 edition of this volume, which has been fully revised, describes in detail, with accompanying photographs and sectional drawings, the types of marine diesel engine in general use. In addition, the book contains full and up-to-date statistics and tables on motorship construction.

The figures disclose that nearly 7,000 motorships were in service in 1938, aggregating a gross tonnage of 15,232,953. Further details reveal a record of 65 per cent in motorship tonnage (compared with total tonnage) under construction during 1938.

Safety—

A TOP EXECUTIVE FUNCTION

AND HOW IT FOLLOWS THROUGH TO THE END OF THE LINE

By S. I. COOPER
Manager, Southern Pacific Steamship Lines

Several decades ago, when the safety movement first came into being, it was "wishful thinking" to hope that top executives might some day become deeply interested in accident prevention.

The safety movement began first with the industrial and transportation companies engaged in operations ashore. It has been only during late years that the maritime industries have even commenced to get safety into their systems, generally speaking.

At the beginning men were more or less left to their own devices. Accidents, deaths, and human suffering were termed "Acts of God," about which nothing could be done. In insolated cases when alert, progressive individuals tried to do something about it, they were invariably "sat on" by somebody a little higher up the organization ladder. As a result of these conditions, there was lack of teamwork, inefficiency, and organizational demoralization. Industry suffered along with its employees. The safety movement has been instrumental in exposing and correcting these intolerable conditions.

• Safety Progress—Evolution of a New Era in Industry

In the past twenty-five years the safety movement in American industry has passed through a number of stages.

The first step was in the thought that the safeguarding of machinery and the elimination of hazardous conditions would eliminate deaths and injuries. Experience then brought a sad disillusionment to industry. Deaths and injuries continued to occur in almost as large proportion after the installation of mechanical guards and safety devices as before.

The second step was in recognition of the fact that the human factors of carelessness, ignorance, inexperience, lack of proper training, improper selection of employees, including junior executives, department heads and workers, and inadequate supervision, played the major part in accidents.

Once that realization spread, the third stage of the safety movement was one of refinement—better organization, more adequate instruction and supervision of employees, more scientific engineering analyses of organization and accident prevention problems.

Of late years great strides have been made by progressive and fearless individuals in bringing the question of organization refinement and accident prevention problems to the direct attention of top executives. Every top executive should be interested in the attainment of scientific management right down the line. Safety research provides the media.

Today we find that the great leaders of industry "head-up" the safety programs in their own organizations and often act as leaders for safety in their home communities. The recent Greater New York Safety Conference and the National Safety Council Congresses demonstrate these facts. Never before in the history of the maritime industry have so many top executives assembled for the "Cause of Safety" as gathered at the Marine Section's "Safety of Life at Sea" luncheon held at the Hotel Pennsylvania, New York City, on March 28, 1939.

• Safety Education

We have learned from the safety movement in general and especially from the experience of you men that accidents **CAN** be prevented; that management **MUST** go further than merely meeting its legal obligations; that workers **CAN** and **MUST** be educated to the safe way of doing their jobs; and that workers **CAN** be taught to think of safety subconsciously during all of their waking moments . Thus, prevention of accidents has become a hallmark of good management in all industry.

• True Democracy and Safety Leadership

What has been accomplished in the conservation of human life in industry is the direct result of the policies of forward-looking top executives and far-sighted workers.

It is a source of real satisfaction to state that the entire railroad industry played such an important part in pioneering safety as a great humanitarian and economic movement. As manager of the Southern Pacific Steamship Lines, it has been my aim and ideal to make our marine operations as safe as is mechanically and humanly possible; in fact, we try to set the pace in the American Merchant Marine for "safety". We endeavor to follow through for safety from the beginning to the end of the line.

• Organizing for Safety

Briefly our safety organization is set up in the following manner:

1. Medical. We maintain an up-to-date medical department in charge of an outstanding physician and surgeon who is assisted by a registered nurse for the conduct of free medical examinations for our employees. These examinations are conducted for the sole purpose of benefiting each individual and employee.

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2. Safety organization in the Operating Department and at the Terminals.

Safety policies are directed from my office. Proper records and statistics of accidents are kept. My assistants and department heads are deputized for safety in operations. Safety recommendations and ideas for improving our operating efficiency are welcomed. There are no organization barriers imposed at any rung of the ladder. All hands recognize that "Teamwork" is of the essence. We want the cooperation and good will of our employees right down the line. We do not have any petty dictators. We strive for united and constructive action.

Each terminal superintendent is in charge of carrying out the safety program for the benefit of all longshoremen. Each foreman is also deputized for "safety" in operations. We enjoy the loyal support and cooperation of our longshoremen for "safety." 127 pairs of safety shoes have been sold to our longshoremen for the prevention of toe and foot injuries. These safety shoes are sold to the men by the company at cost.

3. Safety organization aboard each vessel. Each ship is organized for "safety." Safety meetings are held each voyage. These meetings are presided over by the master. The safety committee consists of all officers who are off watch, the steward, and the radio operator. Safety minutes are prepared.

A sub-committee composed of members of the crew in each department meets during each voyage. The sub-committee is under the direction of each department head, and it reports to the ship's safety committee. It has been our experience that the sub-committees have rendered sensible and constructive safety cooperation at all times. We find that all men invariably respond in the right manner to good treatment. We are proud of the high quality of our unlicensed personnel.

4. Democratic approach. Masters, department heads, officers and crew members know that they are always welcome for the discussion of matters of mutual interest which are of constructive value to the company. We maintain an open door relative to all matters which tend to promote safety and efficiency in operations. Our men are not afraid of being snubbed or having their worthwhile suggestions ignored.

The effective organizations for safety which we have aboard every ship nearly always irons out problems on the spot. Very seldom is recourse to my office necessary. Officers who are good leaders can ordinarily keep their men satisfied and maintain a "happy ship." I reiterate that the quality of leadership is indispensable in any organization from the top executive down.

5. Safety Luncheon. Once a month, our company sponsors a safety luncheon when the entire terminal supervisory force assembles for an after luncheon talk about accidents and safety problems. These meetings help to develop safety, good will, and proper understanding among all hands.

6. Investigation of Accidents. Safety in the marine industry is a great human problem. Cooperation based on a real knowledge of facts and men is bound to bring out an effective solution. That is why we investigate every accident, not for fault-finding purposes, but so that intelligent corrective measures can be applied to prevent similar accidents.

Without facts or with half truths there can be no true opinion formulated for the protection of the men. It is never democratic to suppress facts. No safety program can be made complete unless each and every accident is investigated by the master and department head immediately after its occurrence; statements should be taken from the injured and from all witnesses. At the terminals, accidents are promptly investigated by the superintendent and the gang foreman. A detailed report is submitted at once. Then proper accident prevention measures can be intelligently formulated and put into effect. We learn by experience. Nothing can be perfect, and no person can be infallible.

● Setting a Good Example for Safety

Our masters, officers, department heads, terminal superintendents, foremen and other leaders always have to remember to set a good example. A leader who takes chances himself, who violates his own safety rules, or who pretends not to see safety infractions by his own men, does not get real cooperation of his men in safety. But if he is sincere in his safety endeavors, strictly follows and tactfully enforces the safety rules, he earns respect and co

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operation.

In a large measure, we have been able to develop these high standards of safety and efficiency in operations by keeping our labor turnover small. A sense of loyalty to our company by our men is both the cause and result. Long and faithful service and safety records of most of our employees are our ample reward.

● Safety and Industrial Relations

There is a direct relationship between accident prevention and all other industrial problems, both in the method of attack and the method of cure. While executives must always keep a proper sense of proportion, I should like to say for the benefit of any man who is not already converted to the safety movement, that I am satisfied today that safety goes hand in hand with efficient, economical and high grade operations.

There are always going to be risks in every industry, and the steamship business is no exception.

I am convinced that no maritime operation can now stand the test of modern conditions and achieve safety and efficiency in operations without a progressive safety organization.

Through the safety movement, progress in the American marine industry is strikingly marked at the present time by a new psychology concerning so-called industrial relations. In sharp contrast with past industrial history, we find a new controlling thought. This is, the new appreciation of the importance of the human equation, and of the economic as well as the social value of its protection and conservation.

This new guiding thought is not based on an unattainable ideal. It can give the most practical value in dollars and cents. It adds greatly to efficenecy in operations. Furthermore, as I have endeavored to point out, it greatly reduces labor turnover, the bane of all industry. I still maintain that industry is capable of solving its own problems but it cannot do so by inaction.

● Public Relations

All forms of transportation now recognize that the public interest is concentrated on **SAFETY**. The public wish to travel with safety. The public mind is "safety conscious."

If public relations in the steamship industry are to be maintained on an even keel and kept in balance, there must be constant vigilence for safety in operations. The safety organizations of the Southern Pacific Steamship Lines unquestionably inspire public trust and confidence. We want both our industrial and public relations to be the best.

If we are to profit by experience, there can be no doubt lingering in anyone's mind as to the practical value of safety in steamship operations, and its relationship to the public mind at the bar of public opinion.

It is clear that public opinion demands the American Merchant Marine shall have scientific management and control for safety in operations. The interests of all are jeopardized unless every company is organized for safety. Every company must always appear At the Bar of Public Opinion with clean hands. No major industry has any moral right to allow itself to be unexplained, misunderstood or publicly distrusted; for by its unpopularity it poisons the pond in which we all must fish.

Private ownership in the steamship industry must keep abreast of the flowing stream of public opinion if it is to survive. It must be recognized that the force of public opinion has increased proportionately as we have ascended the scale of civilization. Current public opinion demands **"SAFETY"** in ship operation. Let us have no doubt about this point, and let no one fail to do something about it.

Remember this final thought; intelligent self-interest is guiding the way today towards better standards of operation with a keener realization of the human values in your and our industry and of the mutual rights involved.

The ideals of peace, protection and security toward which the minds and hearts of all men are reaching are not yet fully achieved, but we can report genuine progress and the results of the safety movement in the marine industry speak most eloquently thereof.

(Abstract of paper read before Marine Section, National Safety Council, New York, April 19.)

S. S. Panama and Sisters

(Continued from page 38)

grees F. and a gas velocity of about 100 f.p.s. The driving motors are of 25 H.P.

Three fuel oil heaters of the quintuple, horizontal, sectional, G-fin, marine type were supplied by the Griscom-Russell Co. The capacity of each unit is 6000 lbs. of fuel oil per hour heated from 90° to 225° F. when supplied with steam at 100 lbs. gage pressure.

There are two fuel oil service pumps of vertical, gear in head, screw type with a capacity of 17 g.p.m. at 300 lbs. discharge pressure. These pumps were supplied by the Quimby Co. and are driven by Westinghouse variable speed motors. One auxiliary, vertical duplex, steam-driven fuel oil service pump of Worthington make is also installed. This pump delivers 17 g.p.m. at 300 lbs. discharge pressure and is 7½" x 4" x 6".

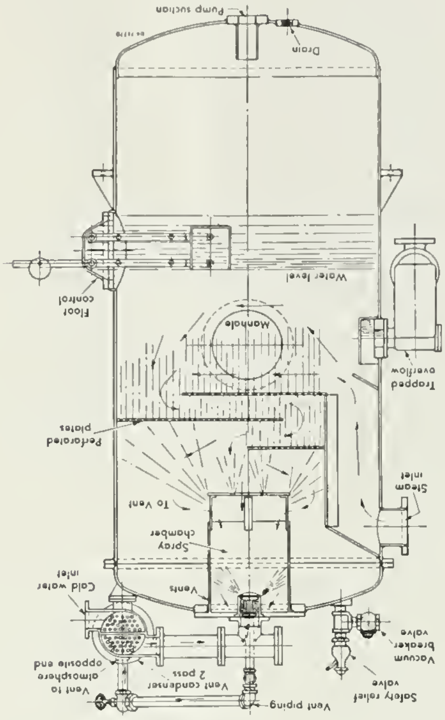
One fuel oil transfer pump of vertical rotary, cycloid type with built-in gear reduction, having a capacity of 225 g.p.m. at 50 lbs. discharge pressure is installed in the fire room. This pump was supplied by the Northern Pump Co. and is driven by a variable speed motor.

In the fire room there is a Warren ballast pump of self-priming, vertical, single stage, top suction, centrifugal type. The priming unit is of the float controlled, reciprocating type. This pump has a capacity of 500 g.p.m. against a total head of 50 ft. and is driven by a Westinghouse constant speed motor of 15 H.P.

In the boiler room there is one 7" x 7" x 6" x 5" Worthington air compressor. It is two-stage, single acting, air-cooled, radial design, with two low pressure and one high pressure cylinders and fan-cooled intercooler. It is driven by a Westinghouse constant speed motor of 40 H.P.

Feed System

The boiler feed system is of special interest. It is designed to keep the water entering the boilers as free from air as possible, and as installed is a closed system.



Worthington deaerating heater.

Condensate is withdrawn from the bottom of the condenser by the condensate pump and is discharged as circulating water through the air ejector to the first stage heater, then to the deaerating heater from which the feed pumps take their suction. This deaerating heater is of Worthington make, designed to deliver 92,000 lbs. per hour of feedwater with an oxygen content of not more than 0.03 c. c. per liter as measured by the standard Winkler test.

One main and one auxiliary feed pump were furnished by Worthington and are driven by Sturtevant turbines. These pumps, of two stage, centrifugal type and each having a capacity of 220 g.p.m. at 575 lbs. pressure, discharge through the third stage heater to the boilers.

The feed pump, for port use, 12" x 8" x 18", of vertical simplex reciprocating type, was also supplied by Worthington. It has a capacity of 150 g.p.m. at 575 lbs. discharge pressure.

Main Steam

Two lines of main steam piping are installed, one port and one starboard, each leading from the boilers to the bulkhead stop valves at the operating platform in the engine room, and are so cross connected that steam from either boiler may be supplied to the engine room through either or both steam lines. Expansion joints being fitted in the for by a series of bends, no expansion joints being fitted in the system. All joints in the main steam line are of the Van Stone type.

Superheated steam from the main steam lines is supplied to the 300 K.W. generator turbines and any turbine can be supplied with steam from either line in case of failure of the other.

A desuperheated steam line in the form of a loop system leading from the boiler supplies steam at full boiler pressure to the main feed pumps, port feed pumps, and other emergency steam - driven pumps. Steam to whistles, sea chests, and air ejectors is suplied from this main through reducing valves.

The starting platform is arranged to allow maximum care in handling and moving the ship. The usual gages, telegraphs, etc., are fitted in convenient positions. In addition to the instruments, there are indicator lights for induced draft blowers, lubricating oil pumps, main condensate pumps and the lubricating oil system.

Evaporators

There is one make-up feed evaporator of the Reilly vertical low pressure type having a capacity of 24 tons per 24 hours with steam supplied at 85 lbs. gage pressure.

There is also one salt water evaporator of the Reilly vertical, submerged coil type with a capacity of 30 tons per 24 hours with steam at 85 lbs. gage pressure.

In conjunction with the evaporators there is a Reilly vertical, marine coil type distiller with a capacity of 25 tons per 24 hours. The system also includes a distiller test tank and a centrifugal motor-driven distiller distributing pump of Warren make having a capacity of 15 g.p.m.

This pump discharges to the drinking water supply, reserve feed and washing water tanks.

A contaminated water evaporator of the horizontal, submerged U-tube type, supplied by Griscom-Russell, has a capacity of 20 tons per 24 hours continuous operating at 100 lbs. gage pressure with steam at 250 lbs.

There are two turbine-driven fire and sanitary pumps supplied by Warren with Terry turbines. Both are of horizontal centrifugal type and each has a capacity of 400 g.p.m. at 125 lbs. discharge pressure.

Two fresh washing water pumps, one drinking water pump and one hot-fresh water pump are installed, all of Warren make, of horizontal centrifugal type and driven by Westinghouse motor.

A fresh water heater of the U-tube six pass type, supplied by Davis Engineering Corp., has been installed.

There is also fitted in the engine room one Worthington vertical, centrifugal, motor-driven pump of the submersible, self-priming type, capable of operating under flooded conditions with suction connected to the main bilge pumping system. This pump has a capacity of 500 g.p.m. against a discharge head of 50 ft. It is driven by a 15 H.P. constant speed Westinghouse motor.

Electrical System

The electrical system is supplied with current from three 300 K.W. General Electric, two-wire, compound wound generators, each driven by a steam turbine through reduction gearing. The generators supply 240-volt direct current for all motor driven auxiliaries such as pumps, cargo winches, steering gear, windlass, capstans, ventilation sets, air compressors, watertight doors, galley equipment, etc., and also the lighting motor-generator sets. Two 75 K.W. 240/120 volt motor-generator sets are supplied for furnishing 120-volt direct current to the lighting system.

The emergency generator, which is located in the emergency generator rooms on the after deckhouse on the Promenade Deck, is a 50 K.W. Crocker-Wheeler 240 volt D. C. generator driven by an eight cylinder Superior diesel engine. In the emergency generator room are also located the emergency switchboard and storage batteries. The storage batteries are Exide type MVSA-11, of approximately 6 K.W. capacity. The emergency switchboard was manufactured by the General Electric Company. An additional emergency switchboard is located at the fire control station and provides distribution for navigating equipment, fire control systems, watertight doors, etc.

The main switchboard, located on the upper level of the auxiliary machinery room, is a ten-section board of the dead-front type manufactured by the General Electric Company.

The lighting of the vessel is divided into two groups or systems, one known as the regular lighting system and the other as the emergency lighting system. Normally the emergency circuits are fed from the lighting motor-generators, but on failure of the main source of supply they are automatically switched over to the emergency storage battery and the emergency generator.

In the layout of the lighting system careful consideration has been given in order to provide adequate illumination throughout all parts of the vessel and to coordinate and harmonize with the decorative features. The decorative fixtures were furnished by the Dayton Manufacturing Co. and the watertight fixtures by the Lovell-Dressel Co.

To provide for the lighting of cargo hatches, large unit, watertight types of fixtures with reflectors are installed on the platform hand rails on the upper part of the kingposts.

Power distribution throughout the vessel is effected by means of power panels located with reference to the units they serve. Throughout the machinery spaces the various motors are remotely controlled by means of push-buttons operating the control equipment. Cargo winches, windlass, capstan, boat winches, etc., are operated manually through master controllers conveniently located to the equipment they serve.

Alternating current required for certain secondary systems, such as the Gyro compass, engine telegraphs and loudspeakers is furnished by motor generators located near the apparatus they serve. A complete system of call bells is provided with a pushbutton in each passenger stateroom and an annunciator in "A" Deck pantry. The wheelhouse and officers' staterooms are also connected with this system. A tell-tale connected with this system is located in the main pantry on "B" Deck.

Hull Equipment

The steering gear, of the electro-hydraulic type with athwartships ram operating a double tiller aft of the rudder stock, was furnished by the Lidgerwood Manufacturing Company. It is controlled from the wheelhouse by a hydraulic telemotor system. The steering gear control is also connected to the Sperry gyro pilot unit.

A tiller is fitted to the rudder stock extension for emergency steering by means of tackle operated by the stern capstans.

Anchor chain is 2½" Naco Stud link cast steel chain furnished in two 150 fathom lengths.

The anchor windless machinery, which was supplied by Lidgerwood, is located in the windlass room on "A" deck forward, with the vertical shaft wildcats and capstan heads on the deck above.

Two warping capstans are located on the Promenade Deck aft, port and starboard.

Windows, Ports and Doors

All airports and windows opening on the exterior of the ship are brass or bronze. All opening are screened, as this is particularly necessary due to the tropical service of the ship. Airports of 14" diameter are fitted throughout the ship below the Promenade Deck, except in the verandas, where sliding sashes are fitted.

Large bronze casement sashes are fitted in the openings on each side of the hall and lounge on the Promenade and Boat Decks. Casement sashes were furnished by the Truscon Steel Products Company. The steel casement sashes for the inside veranda staterooms were also furnished by Truscon.

Windows in staterooms on Promenade and Boat Decks are double lift windows fitted with sliding jalousies. These windows are by the

Kearfott Engineering Company. Kearfott also supplied the frameless sashes in the Promenade Deck enclosure and wheelhouse and the uniframe sashes in the verandas. The design of wheelhouse windows provides for two sashes which meet in the middle, making it possible for only a narrow slot to be opened for visibility in wet weather.

All doors throughout the ship are metal. Doors on the decks fore and aft, and in the cargo and machinery spaces, are of steel plate, manufactured by the builder.

Navigating Equipment

The navigating equipment of the Panama is modern and complete.

The wheelhouse is located at the forward end of the sun deck with an open bridge to port and starboard. The forward bulwark of the bridge has a curved front for deflecting the wind upward clear of the officers on watch. The chart room is immediately aft on the port side and the fire control room connects with the wheelhouse on the starboard side. The wheelhouse is exceptionally roomy for a vessel of this size and contains the main steering wheel and telemotor binnacle, Gyro pilot unit, Gyro repeater, engine telegraphs, rudder angle indicator, revolution indicators and fathometer, whistle controls, running light telltales, and loudspeaker cabinet.

Binnacles are Kelvin-White with Navy standard No. 1 compasses.

A complete Sperry Gyro compass system has been installed. The master Gyro compass together with the motor generator and control panel is located in the fire control station. A two unit Gyro pilot system is also installed. A course recorder is located in the chart room and a rudder angle indicator in the wheelhouse. Sperry also supplied the searchlight over the wheelhouse.

A typical officer's stateroom.

A Submarine Signal Company recording fathometer is installed in the wheelhouse, and a Kelvin merchant pattern sounding machine is fitted on the boat deck below the bridge. The radio direction finder, which is in the chart room, was furnished by the Radio Marine Corporation of America. Two Cory-Kent clear view screens are installed in the wheelhouse.

A complete set of engine order telegraphs was supplied by Charles J. Henschel, Amesbury, Mass. A shaft revolution indicator system was also furnished by Charles J. Henschel.

Sound signals are given by means of two Tyfon Whistles manufactured by the Leslie Company. The whistles are of different sizes; the first is the largest and most powerful whistle ever installed on a vessel flying the American Flag. A complete automatic whistle control system, furnished by the manufacturer, is located in the wheelhouse.

There are two systems of sound powered telephones installed.

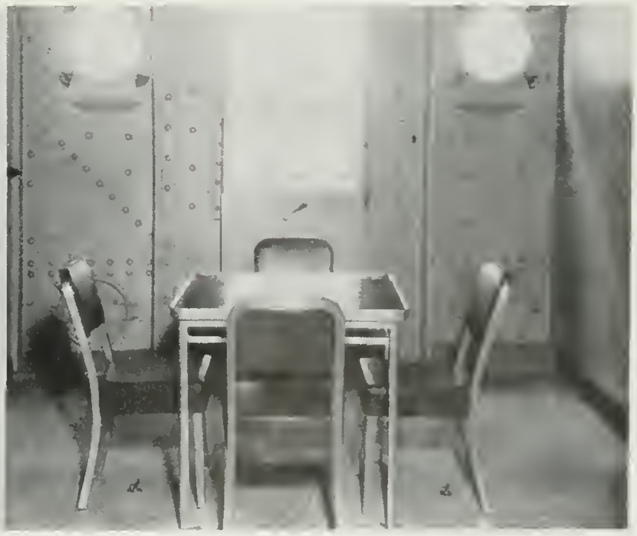
A complete ship's radio communication system, supplied by Radio Marine Corp., is installed.

Cargo Handling

The cargo handling arrangements for the Panama are designed to permit the rapid loading and discharge of cargo. Cargo from the five hatchways is discharged by means of 8 five-ton booms, 4 ten-ton booms and 2 thirty-ton booms, mounted on six kingposts. The 2 ten-ton booms aft are rigged for handling 5-ton loads as well.

The hoisting equipment consists of 8 single drum, single gear electric cargo winches, and 4 double drum double gear electric cargo winches, furnished by McKiernan-Terry Corporation, Lambert National Division.

Each winch is driven by a 35-horsepower watertight enclosed



Officers' mess and a private veranda serving four rooms for crew.

Westinghouse motor.

The single drum winches have a capacity of 3500 lbs. at a rope speed of 280 feet per minute and the double drum winches a capacity of 3500 lbs. at 280 ft. rope speed per minute for the high speed drum and 5500 lbs. at 160 ft. rope speed per minute for the low speed drum.

All blocks for the cargo gear were supplied by the Boston and Lockport Block Company.

Cargo loading and discharging for the refrigerated cargo spaces is performed by 4 vertical inclined belt conveyors, permanently installed on board the ship. Two conveyors are located forward and serve all cargo spaces in No. 4 hold, and two conveyors serve cargo spaces in No. 5 hold aft. These conveyors, manufactured by the Portable Machinery Company, designed to handle bananas, frozen meat and small bales or boxes, are guaranteed to handle 1500 stems of bananas per hour or equivalent quantities of packages.

Refrigeration

The total refrigerated cargo space of 90,460 cu. ft. with a banana carrying capacity of about 25,000 bunches, and the refrigerated spaces for ship's stores, are located as shown on the plans.

Refrigerated spaces are insulated with spun glass packed to 12 lbs. per cu. ft., and sheathed by Stonewall plastic finish on galvanized expanded metal supported by angle furring. The thickness of insulation generally is 12".

All refrigeration for the ship is supplied by four duplicate Carrier machines located on the lower level of the auxiliary machinery room. Each unit is driven by a 45 H.P. Westinghouse motor and has 35 tons refrigeration capacity in 24 hours. The cooling of the cargo spaces is effected by means of direct expansion of the Freon in unit air coolers, known as cold diffusers. Two cold diffusers are arranged in each refrigerant cargo space with ducts running fore and aft on the outboard side of the space to distribute the cold air. Return of the air to the diffuser is effected by means of return ducts across the end of each compartment or by return openings in the diffuser assembly.

There are two additional machines of $3\frac{1}{2}$ tons capacity each with 10 H.P. direct current Westinghouse motors for serving the cooling coils in the ship's stores spaces, for cooling the ice-making tank, and cooling four small galley refrigerators.

A control panel for all refrigerating equipment is located in the refrigerating machinery space, and by means of tell-tale lights the engineer on watch can tell exactly what motors are running in any part of the system.

Ventilation

The vessel is fitted with an unusually comprehensive ventilating system. All passengers' and crew's accommodations, all public spaces, all work spaces and storerooms, as well as the machinery spaces, are ventilated by mechanical means.

To provide really satisfactory ventilation in passenger and crew accommodations and in the galley, it was arranged that there should be both supply and exhaust systems of equal capacity. All fans were supplied by the Ilg Electric Ventilating Company. The cargo holds, except refrigerated spaces, are provided with natural ventilation. All fans, except those for machinery spaces, are provided with a master control at the fire control station so that they can be shut down in case of fire.

The main dining room and the crew's mess rooms, as well as the inside rooms for the chief steward, the purser and the stewardess, are air-conditioned. All air conditioning equipment was furnished by Carrier.

All cargo spaces, except the refrigerated holds, have natural ventilation. Each cargo space has two supply trunks and two exhaust trunks, located against the transverse bulkheads, which also serve as access trunks from the various cargo spaces to the Promenade Deck. These trunks are capped by specially designed vent heads arranged for supply or exhaust, according to location.

Fire Underwriters Association Tax Exempt

The Commissioner of Internal Revenue at Washington, D. C., has just handed down two decisions granting complete exemption from federal taxes to the Fire Underwriters' Association of the Pacific. The first ruling relates to the Social Security Act and holds that the Association is exempt from both the unemployment and old age pension taxes levied by that Act. The second ruling grants complete exemption from the federal Income Tax Act.

The rulings are based on those provisions of the federal laws which grant tax exemptions to institutions which are organized and operated exclusively for educational purposes. When the matter was first presented to the Commissioner he ruled that the Association did not come within the terms of the exemption, but the Association requested a rehearing and succeeded in having the Commissioner reverse his ruling on the grounds that the Association's activities are purely educational.

The matter was handled on behalf of the Association by William H. Levit of the insurance law firm of Long & Levit. Mr. Levit pointed out that the ruling should prove of particular interest to individuals and insurance companies who are interested in assisting the activities of the Fire Underwriters' Association of the Pacific, for the reason that the Commissioner also ruled that contributions to the Association by individual and corporate donors may be deducted by such donors when figuring their net income for income tax purposes.

Observations From The Crow's Nest

"NAMES AND NEWS" ★ BY BERNARD De ROCHIE

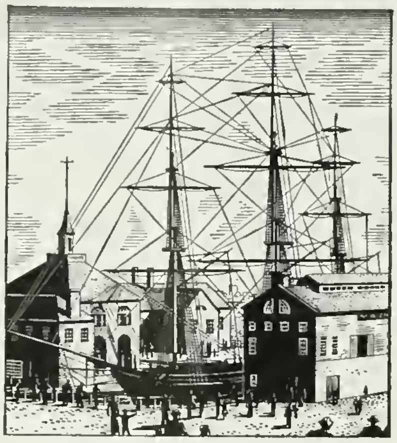
Rigging an Exhibit

The New England Exhibit at the New York World's Fair is a picturesque waterfront scene including merchant's warehouse building and a two-story structure which will house the exhibit materials furnished by the participating States, portraying the industrial, recreational, agricultural and educational advantages of New England.

The entire exhibit is built around a 125-foot replica of a full-rigged, three-masted merchantman lying at dock, whose towering masts, spars and rope rigging are visible over the greater part of the Fair Grounds.

Back in the early days of the Plymouth ropewalk, New England enterprise was symbolized to the world by her fast-sailing merchant ships and crack clippers whose daring skippers drove them through fair weather and foul with all sail set, relying on the strength of canvas and hemp rigging. The first American Merchant Marine was in its ascendancy and dependable cordage from the Plymouth ropewalk was in demand by sailing ships of the day.

The day of the sailing ship is now long past and a new merchant marine has taken its place, but Plymouth is serving these new ships as it did a century and more ago. What more fitting, therefore, than the Plymouth Cordage Company being called upon to furnish a complete "gang of rigging" for the New England Ship at the New York World's Fair 1939.



The New England Exhibit at the New York World's Fair this year makes one re-live the traditions of the old sailing-ship days! "The most outstanding and unique exhibit at the World's Fair," says Grover Whalen.

The type of ship represented by the World's Fair replica was used in the East Indian, West Indian, South American and Mediterranean trades. According to Howard I. Chapelle, marine architect, in charge of the technical details of the ship's construction, the lines of her hull were taken from a builder's half-model said to represent the ship "Ohio," built at Kingston, Massachusetts, about 1830.

Rigging specifications for this ship aggregate approximately eight tons of cordage—four-strand Tarred Hemp Lanyard for standing rigging, consisting of shrouds and stays to support the towering masts, while the running rigging is principally of three-strand Manila.

In the old manner of rigging a ship, the rope has been especially made for the purpose by the Plymouth ropemakers, reverting to manufacturing practice of the early days—further evidence of the adaptability which has kept the Plymouth Cordage Company in step with changing times and rope needs since 1824.

Safest Year

Operations in 1938 were the safest on record for Bethlehem Steel Company. A comparative study of safety work just completed by the company's Safety Staff reveals that in 1938 fewer accidents per "man-hour" occurred in its steel plants, in shipyards and other operations than in any year in which special accident records have been kept. The monthly average number of workers last year was 82,680.

Since 1916, when the present program of accident prevention was instituted, accidents have been reduced by 80 per cent. Last year showed a reduction in accidents of ten per cent as compared to the previous year. During the past five years, which represent 672,000,000 man-hours of employment, the study indicates that accidents have been reduced by one-half.

One of the sidelights on last year's safety record was the operation of the company's Cambria Plant at Johnstown, Pa., for a 91-day period, representing 3,217,736 man-hours, without a lost-time accident of any kind. At another plant, where a study of accidents was made in conjunction with the company's employee relief plan, it was brought out that accidents that occurred outside the plant and that entitled the employees to relief payments were nearly three times more numerous than the "lost-time" accidents that took place in the plant. Automobile accidents took the heaviest toll among accidents that occurred outside the plant, with falls on sidewalks and streets ranking second, and falls in the home, third.

A feature of safety promotion work at Bethlehem during the past few years has been the emphasis each month of some specific safety topic. Thus, the attention of the whole organization is officially directed toward certain types of known hazards each month.

Emphasis during the current year is placed on the further perfection of physical safeguards against accidents, such as making plant layouts safer, or the remedying of unsafe conditions from such cases as improper lighting, improper dress or apparel, or defective equipment. The emphasis last year was on the personal factor, which so often contributes to accidents.

"Folies de Sept Mers" to regale Propellers!

"Folies de Sept Mers,"—to San Francisco Bay's shipping fraternity meaning "Follies of the Seven Seas," —is the romantic motive of the tenth annual spring banquet of the Propeller Club of California, to be held the evening of May 12 at the Aquatic Casino, foot of Polk Street.

Chairman Eddie

Because encompassing seven oceans for talent is a far-reaching undertaking, Propeller Club Entertainment Chairman E. J. MacFarlan has sent out his 1939 banquet committee literally on the wings of the four winds in order that no phase or touch of glamour may be missing for this spring round-up.

Coca Cola Detail

To Howard Bernhard and Harold Weule is assigned the task of concocting refreshments carrying the seven seas spirit. The Attendance Sub-Committee, Robert E. Cristy, Mac Gilmore, Fletcher Monson and Frank De Pue, already report that reservations are pouring in. This committee is working on a table arrangement in keeping with the motive of the evening's entertainment. The guests will be arranged at tables in a sea shell fanlike formation around the dancing and performance area.

10th ANNUAL
SPRING BANQUET
Friday Night, May 12
at the
Aquatic Park Casino

One big night of fun—
A real fiesta floorshow.
Be aboard!

A Magnificent Setting
Good Fellowship
Tops in Entertainment
A Superb Banquet

Join Your Shipmates—
on This Night of Nights
! ! !

Spotlight Expert

Illumination with the colors of each distant land is the difficult undertaking in the hands of Jerome Lalor, chief theatrical stage illuminator.

R. H. Glissman is directeur of the Folies de Sept Mers. He was dispatched on talent procuring work early this year and reports now in hand show that we will see features accurately representative of the lands bordering the seven seas. Directeur Glissman today announced: "Color is indeed the spirit of this Propeller pageant. We will put all past performances in the shade!"

Reservations Going!

Bern De Rochie is preparing the thme song for this interocean parade of pulchritude.

Entertainment Chairman MacFarlan, in view of the rush for tables and reservations, today sent out a flash urging Propellers to reply immediately as to their reservation requirements. To summarize, Chairman Eddie today exclaimed: "Every craft coming in the Golden Gate will certainly stop in its tracks if they train a glass on our Propeller Club Follies the evening of May 12!"

P.F. (Publicity Fellow).

Cruise for Junior F T A

Awake to San Francisco's growing importance in the nation's foreign commerce, the Junior Foreign Trade Association of the San Francisco Chamber of Commerce has chartered the M.S. Paradise for a cruise inspection of the port on May 7.

Weighing anchor at Pier 14, accompanied by wives and friends, the group will view the Embarcadero wharves, and sailing North by West, will skirt the transport docks. Aquatic Park, Fisherman's Wharf, Yacht Harbor and the Presidio, then circle under the Golden Gate Bridge to the Marin shore and Angel Island, toward the East Bay, and finally will settle at anchor in Treasure Island's Port of Trade Winds before circling Yerba Buena and passing beneath the Bay Bridge on the return home.

According to President Ray Waterlow of the association, this unusual opportunity to survey the entire harbor from shipboard is sure to make every member a loyal booster for San Francisco's splendid port facilities. Gene Campbell heads the committee making arrangements for the cruise, assisted by Hy Coplan, Bob Goodman, Jos. Del Valle Jr., and Jack Prior.

O. H. SMITH

Recent resignation is that of O. H. Smith, who left the post of port steward for American President Lines owing to ill health. He had been in that post for six months with the APL and for a number of years with the old Dollar Line.

Henry E. Frick, vice president and operating manager, in speaking of Mr. Smith's resignation, named **Joseph Robinson,** formerly chief steward on the President Coolidge, as successor. **John J. Presser,** for many years port steward for Pacific Steamship Lines, was appointed chief steward on the Coolidge. He is a veteran in transpacific service, beginning his experience as a mess boy with the old Pacific Mail Steamship Company.

Left to right: Walter Breed and Alberto Scott, Jr., of the Marine Committee of San Francisco Junior Chamber of Commerce, presenting picture of San Francisco to A. O. Pegg, superintending engineer of Union Oil Company; chief engineer A. Davis; A. L. Quackenboss, Union Oil's marine operating representative at Oleum refinery; Captain Hans Halvorsen of the L. P. St. Clair; and R. Linden, Central Division manager for Union Oil Company of California.

News of "The Bilge Club"

By William A. Mason

Lieut. Commander, U. S. Navy
(Retired)

The annual meeting of the Bilge Club will be held Tuesday evening, May 2, at the club headquarters in the California Yacht Club at Wilmington.

At this meeting the new directors for the ensuing year will be elected as well as the new president.

Due to an amendment to the bylaws which was adopted lately two of the directors have submitted their resignations—Tom Forster of the Bethlehem Shipyard, and Arthur Woll of the General Petroleum Corp. Pending the election of permanent directors to take the place of these two, the following members have been temporarily appointed: Lieutenant Commander William A. Mason, U. S. Navy (retired) and Remington Mills of the Crescent Wharf and Dock Co.

L. B. STAVER

Advices reaching us from the East state that L. B. Staver, assistant to **Edward C. Moran, Jr.,** member of the Maritime Commission, tendered his resignation the early part of April to become president of the Pacific Northwest Oriental Company.

This company has been designated as managing agents for the Maritime Commission for the purpose of operating four freighters inaugurating the Seattle-Orient service, these four to be followed by two others, themselves to be followed by four combination passenger and freight carriers for the trade.

Marshall L. Wilcox, director of the division of operations and maintenance for the Maritime Commission, has also resigned. He will return to his old post with United Fruit Company.

JOSEPH ROBINSON

After serving on the President Coolidge of the American President Lines, Joseph Robinson was appointed port steward of the company a month ago and has now taken himself a bride. Audrey Casey, daughter of Capt. John Casey of the Police Department, and Mr. Robinson were married on April 22 before a large gathering of friends.

American Bureau Holds Annual Meet

The 77th annual meetings of the Board of Managers and of the members of the American Bureau of Shipping were held recently in the bureau's board room, 24 Old Slip, New York City.

President J. Lewis Luckenbach presided and expressed his gratitude to more than 60 managers and members, which was the largest attendance in the bureau's history.

Mr. Luckenbach was re-elected president for the seventh time and the following were re-elected: **Walter L. Green,** vice president; **David Arnott,** vice president- chief surveyor; **Jerome B. Crowley,** treasurer; and **John W. Cantillion,** secretary and assistant treasurer. **Frank Gair Macomber** and **Joseph W. Powell** were re-elected honorary vice presidents.

Elected to the Board of Managers for the three year term expiring January, 1942, were:

Fraser A. Bailey, Robert L. Hague (deceased), Robert Haig, Lynn H. Korndorff, John McAuliffe, Samuel D. McComb, John F. Purcell, H. W. Warley, William D. Winter.

Elected members of the bureau were:

Patrick Calhoun, president, American Barge Line, Louisville, Ky.; Charles T. Campbell, vice president, Campbell Transp. Co., Pittsburgh, Pa.; L. W. Childress, president, Mississippi Valley Barge Line, St. Louis, Mo.; Percy Chubb, Chubb & Son, New York City; Alexander Dann, president, Union Barge Line, Pittsburgh, Pa.; Clement L. Despard, president, Despard & Co., New York City; Walter C. Dressler, vessel manager, Oglebay Norton & Co., Cleveland, Ohio; Herbert F. Eggert, vice president, Marsh & McLennan, New York City; George H. French, president, Maryland Dry Dock Co., Baltimore, Md.; Herbert Haslam, vice president, Kellogg S.S. Co., New York City; J. H. Hillman, Jr., chairman, Hillman Transp. Co., Pittsburgh, Pa.; Arthur B. Homer, assistant vice president, Bethlehem Steel Co., New York City; Vincent K. Hull, president, Agwi Lines, New York City; John F. Keegan, vice president, Johnson & Higgins, New York City; Stanley Kennedy, president, Inter-Island Steam Nav. Co., Ltd., Honolulu, T. H.

R. J. Lamont, president, Todd-Seattle D. D., Inc., Seattle, Wash.; J. E. Lose, vice president, Carnegie-Illinois Steel Co., Pittsburgh, Pa.; Frederick B. McBride, marine manager, Fireman's Fund Ins. Co., New York City; W. S. Newell, president, Bath Iron Works, Bath Maine; Inman Payne, president, Cosmopolitan Shipping Co., New York City; E. J. Perrin, vice president, Automobile Ins. Co., New York City; Carl E. Petersen, Matson Navigation Co., San Francisco, Calif.; E. C. Robertson, vice president, Pittsburgh Coal Co., Pittsburgh, Pa.; Thomas H. Rossbottom, vice president, Panama R. R. Co., New York City; C. T. Samuelson, president and general manager, Pennsylvania Shipyards, Inc., Beaumont, Texas; Raymond D. Sullivan, manager, Marine Office of America, Chicago, Ill.; C. S. Timberlake, marine vice president, Hartford Ins. Co., Hartford, Conn.; John A. Young, vice president, Young Bros., Ltd., Honolulu, T. H.

In line with present-day practice, Mr. Luckenbach announced the institution in the bureau of a guaranteed pension system for all employees. This retirement plan is in addition to the group life insurance protection for employees' families, which has been in effect for fourteen years.

Mr. Luckenbach reported that on January 1, 1939, there were 149 vessels of 583,830 gross tons being built to American Bureau of Shipping classification, whereas on January 1, 1938, there were 92 vessels of 283,830 gross tons being built to the bureau's class. This includes 16 large tankers, 32 freight vessels for the United States Maritime Commission, 3 passenger-cargo vessels for the Panama Railroad Company, 3 passenger-cargo vessels for the Mississippi Shipping Company, 4 cargo vessels for the American-Export Lines and one large passenger vessel for the United States Lines. Additional orders for approximately 90,000 gross tons have been placed since January 1, bringing the total tonnage under construction to a figure in excess of 670,000 gross tons.

Award of the following prizes and scholarships for the year 1938 were announced by Mr. Luckenbach:

The Captain Charles A. McAllister Prize for Proficiency in Engineering at the Coast Guard Academy was awarded to Cadet Alexander W. Wuerker.

The American Bureau of Shipping Prize for excellence in studies in Naval Architecture and Marine Engineering was awarded to the following: Alexander P. Bates, Jr., Massachusetts Institute of Technology; Charles E. Dart, University of Michigan; John DuBois Pierson, Webb Institute of Naval Architecture.

The Stevenson Taylor Scholarship was awarded to H. M. Wood of Massachusetts Institute of Technology.

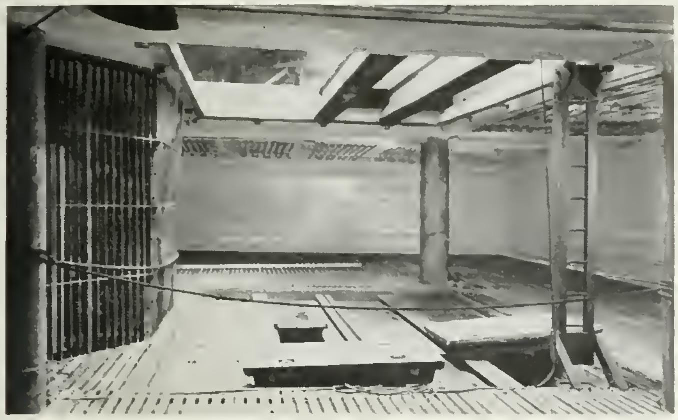
The Stevenson Taylor Memorial Prize (Engineering Thesis) was awarded to Howard Millard Hardy of Webb Institute of Naval Architecture.

● Present at the Annual Meeting of the American Bureau of Shipping

R. R. Adams, Grace Line, New York; Geo. A. Armes, General Eng. & D.D. Co., Oakland, Calif.; John S. Ashley, M. A. Hanna Co., Cleveland, Ohio; Gen. T. Q. Ashburn, Inland Waterways Corp., Washington, D. C.; R. J. Baker, American Merchant Marine Institute, New York; John J. Boland, Boland & Cornelius, Buffalo, N. Y.; R. L. Bowditch, C. H. Sprague & Sons, Boston, Mass.; Ernest M. Bull, A. H. Bull S.S. Co., New York; Ira A. Campbell, New York; Douglas F. Cox, Appleton & Cox, New York; O. D. Duncan, New York; V. B. Edwards, Dravo Corp., Pittsburgh, Pa.; Edward P. Farley, E. P. Farley Co., New York; James A. Farrell, Jr., American South African Line, New York;

(Continued on Page 66)

LOW TEMPERATURE • HIGH TEMPERATURE



Marine Insulation by MUNDET

One of the largest marine insulation jobs has been completed recently by Mundet for the S. S. *Vancouver*, Hamburg-American liner. Wherever low temperature is required, on shipboard and on shore, it pays to have the dependable protection of Mundet Corkboard and Moulded Cork Pipe Covering. For high temperature requirements, Mundet's Pacific Coast warehouses carry a full line of K & M asbestos and magnesia insulation products made by Keasbey and Mattison.

MUNDET CORK CORPORATION

LOS ANGELES - - - - - - - - - - 2051 East 37 St.
SAN FRANCISCO - - - - - - - - - - 440 Brannan St.

Distributors of Mundet Cork Insulation Products

SEATTLE - - - - - - - - Pioneer Sand & Gravel Co.
PORTLAND - - - - - - - Pacific Asbestos & Supply Co.

WEATHER-WISE and TOUGH!

ASK THE NATIONAL LEAD MAN

IN SHOWERS . . .
IN GALLEYS . . .

Alundum Tile Floors, Non-slip When Wet

FOR every place aboard ship where there is a slipping hazard there is a suitable Norton Floors product—Alundum Tiles and Aggregates. Each product provides dependable walking safety — a surface that will not wear slippery — whose effectiveness is not lessened by water.

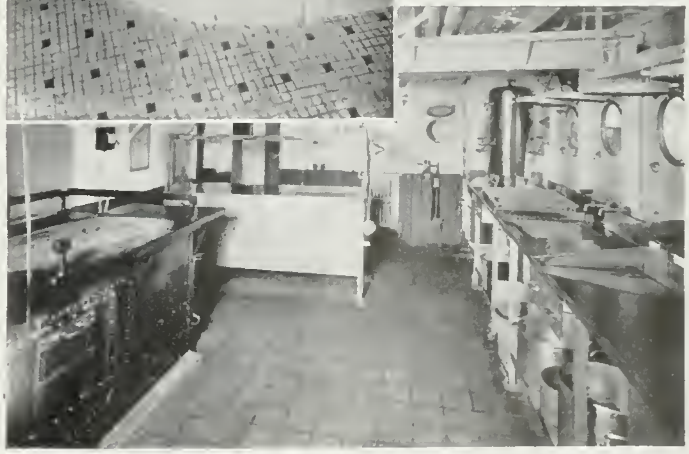
For lavatories, showers, around swimming pools and similar places there is Alundum Ceramic Mosaic Tile.

In galleys Alundum Floor Tile in the 6 x 6″ size is most used.

Terrazzo is made non-slip when wet with Alundum Aggregate.

NORTON COMPANY
WORCESTER, MASS.

T-458



NORTON FLOORS
ALUNDUM TILES—TREADS—AGGREGATES

Building in American Yards

Pacific Coast

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
(Union Plant)
San Francisco

DRYDOCK AND ROUTINE REPAIRS: **President Monroe, Knud Rasmussen, San Clemente, Point Salinas, President Coolidge, Tug Standard No. 1, Vitus Bering, Coya, Peter Lassen, M.S. Richlube, Kainalu, Tug Gov. Markham, San Antonio, Shell Oil Barge No. 5, Chipana, Calmar.**

THE CAMPBELL MACHINE CO.
Foot of Eighth St.
San Diego, Calif.

DRYDOCK AND ROUTINE REPAIRS: **Olympia, Sao Joao.**

FELLOWS & STEWART, INC.
Wilmington, Calif.

DRYDOCK AND ROUTINE REPAIRS: **60 foot fishing hull for Paramount Pictures, Yacht Tamalmar, Purse Seiner Ocean Gift, Auxiliary Schooner Lanakai; 67 vessels for regular spring overhauling.**

GENERAL ENGINEERING & DRY DOCK CO.
Foot of Fifth Avenue
Oakland, Calif.

DRYDOCK AND ROUTINE REPAIRS: **Derrick Barge No. 8, Barbara C., Gas. S. Star of Monterey, Scotia, Dredge Oakland No. 2, Dredge Sacramento, Lumbertown, Tug Humaconna, Gas. S. Motormates, Gas. S. Frances.**

HARBOR BOAT BUILDING CO.
Berth 264, Fish Harbor
Terminal Island, Calif.

NEW CONSTRUCTION: **Two 40-foot high speed fishing cruisers.** Completion date April 15, 1939.

HONOLULU IRON WORKS
Honolulu, T. H.

DRYDOCK AND ROUTINE REPAIRS: **M.S. Trade Wind, Atlantic, Eastern Guide.**

LAKE WASHINGTON SHIPYARDS
Houghton, Wash.

NEW CONSTRUCTION: **200 foot steam geared turbine steel survey ship Explorer for U. S. Coast & Geodetic Survey.** Estimated delivery date January 1, 1940.

Timber work on two caissons for Tacoma Narrows Bridge.

DRYDOCK AND ROUTINE REPAIRS: **U. S. Coast and Geodetic Survey Service Surveyor and Guide, Dredge Pacific, Mine Planter Bell, North Pacific.**

LOS ANGELES SHIPBUILDING & DRY DOCK CORP.
Los Angeles Harbor
San Pedro, Calif.

DRYDOCK AND ROUTINE REPAIRS: **S. O. Barge No. 7, Ellin, Torres, M.V. Tyoyo Maru No. 6, Sch. Wm. H. Harriman, Barge Erskine M. Phelps, M.V. Vaquero, F. B. Paramount, Warwick, M.V. Thorshov, Barge Samson, M.V. Korrigan IV, El Capitan, Roxen.**

MARE ISLAND NAVY YARD
Mare Island, Calif.

NEW CONSTRUCTION:

Swordfish, Submarine (SS193); keel laid October 27, 1937; estimated launching date April 1, 1939; estimated delivery date August 1, 1939.

Two harbor tugs, YT 133 and YT 134; keels laid September 29, 1938.

Garbage Lighter (YG 21); keel laid July 25, 1938.

Order received for construction of one submarine tender, Fulton (AS 11); dated June 30, 1938.

Order received for construction of one submarine, Tuna (SS203); dated June 30, 1938.

DRYDOCK AND ROUTINE REPAIRS: **Clark, Cassin, Conygham, Downes, MacDonough, Worden, Partridge, Unadilla, Dobbin, Eagle No. 32, Ard-1, Pollack, Plunger, Permit, Cachalot, Cuttlefish, Duane.**

THE MOORE DRY DOCK CO.
Oakland, Calif.

NEW CONSTRUCTION:

Hulls Nos. 193 and 194, two lighthouse tenders for Bureau of Lighthouses; LOA 174′ 10½″, beam molded 32′, depth 14′ 6″. Twin screw triple expansion engines; water tube boiler; 1000 horsepower. One for Pacific Coast; one for Great Lakes. Keel for first ship laid December 5, 1938. **Launched March 18 and March 22, 1939.**

Hulls Nos. 195 and 196, two cargo vessels for U. S. Maritime Commission; LOA 492′ 0″, LBP 465′, breadth molded 69′ 6″, depth molded 42′ 6″, SHP normal 8500, SHP max. 9350, dis. 17,600 tons, deadweight 11,926 tons; steam turbine propelled. No. 195, keel laid March 18, 1939.

DRYDOCK AND ROUTINE REPAIRS: **Coloradan, Arkansan, Mindanoa, San Simeon, Santa Monica, H. T. Harper, R. J. Hanna, Silverguava, Chirikof, Polaris, Raby Castle, Virginian, Barge 95, Nevadan, West Shipper, Panaman, M. H. Whittier, Isleton, Silverpeak, Transport Meigs, Curaca, Arizonan, Purse Seiner Sunmaid, Barge 1923. O. A. Brodin, Yacht Zaca, Purse Seiner Sea Lion, District of Columbia, Bengalen, Illinoian, El Commodore, S.C.T. Dodd, Point Lobos, Port of Stockton.**

THE PUGET SOUND NAVY YARD
Bremerton, Washington

NEW CONSTRUCTION:

U.S.S. Wilson (Destroyer No. 408); standard displacement, 1500 tons; keel laid March 22, 1937.

U.S.S. Charles F. Hughes (Destroyer No. 428); standard displacement 1600 tons; order placed by Navy Department December 7, 1937. Keel laid January 3, 1939.

Ships authorized, work not started: Woban (YT138), harbor tug; Ala, (YT139), harbor tug; Barnegat (AVP10), seaplane tender; Biscayne (AVP11), seaplane tender; Monssen (DD436), destroyer.

DRYDOCK AND ROUTINE REPAIRS: **Arizona, Nevada, Maryland, Saratoga, Eagle No. 57, Pyro, Ingham, Spencer.**

TODD SEATTLE DRY DOCKS, INC.
Harbor Island
Seattle, Wash.

DRYDOCK AND ROUTINE REPAIRS: **Tacoma Bridge Caisson, Alaska, Mary D., Latouche, Derblay, M.V. General, M.S. Chilean Reefer, Point Chico, Tug Goliah. M.S. Standard Service, M.S. Clevedon, North Sea, Edda, Paul Luckenbach, Hollywood.**

WESTERN BOAT BUILDING CO., INC.
2505 East 11th Street
Tacoma, Wash.

NEW CONSTRUCTION:

Hull No. 134, tuna clipper 90′ x 24′ x 13′; 275 H.P. Union Diesel. Launching date February 15, 1939.

Hull No. 136, purse seine fishing boat 96′ x 22′, powered by 240 H.P. Atlas Diesel engine. Keel laid January 30, 1939; launching date March 1, 1939.

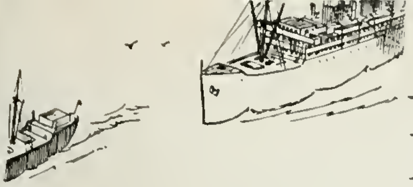
Atlantic, Lakes, Rivers

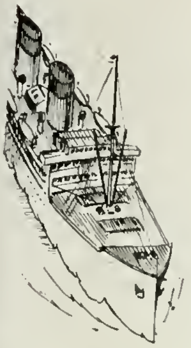
AMERICAN BRIDGE COMPANY
Pittsburgh, Pa.

NEW CONSTRUCTION:

Six standard coal barges 175′ x 26′ x 11′, for builder's account.

Eleven coal barges with double steel bottom 195′ x 35′ x 11′, for Central Barge Co., Chicago.





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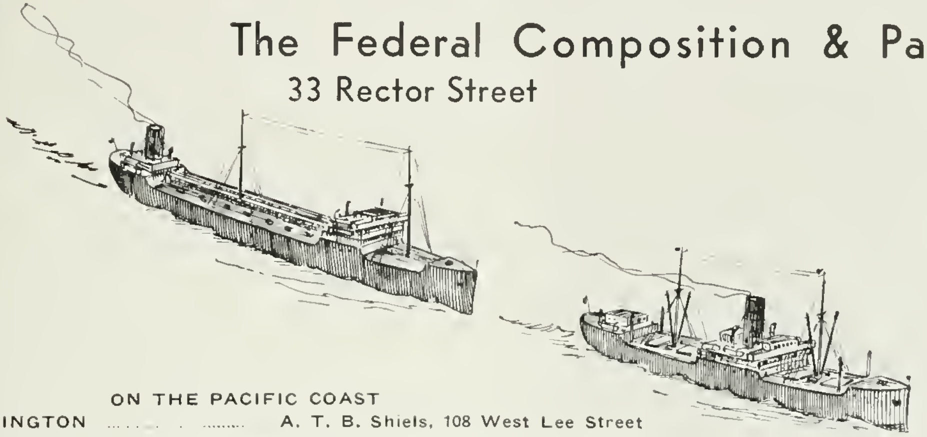

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One relay barge 104′ x 34′ x 8′ for the Panama Canal. Delivery date January 1, 1940.

Fifteen double deck covered barges 198′ x 35′ x 11′ for Mississippi Barge Line Co., St. Louis, Mo.

BATH IRON WORKS

Bath, Maine

NEW CONSTRUCTION:

Hulls Nos. 170-171, DD409, Sims, and DD410, Hughes, two 1500-ton destroyers for U. S. Navy; contract date October 12, 1936; keels laid July 15 and September 15, 1937, respectively. **Launching date, DD409, April 8, 1939;** delivery dates, June and August, 1939, respectively.

Hulls Nos. 177 and 178, DD423 and DD424, two 1620-ton destroyers for U. S. Navy. Contract date September 30, 1937; delivery dates April and June, 1940, respectively.

Hulls Nos. 180-181, DD429 and DD430; two 1620 ton destroyers for U. S. Navy. Contract dated August 15, 1938; delivery in 28 and 30 months, respectively.

BETHLEHEM STEEL COMPANY, INC.

Shipbuilding Division
Fore River Yard
Quincy, Mass.

NEW CONSTRUCTION:

CV7, Wasp, Airplane Carrier for U. S. Government; keel laid April 1, 1936; **launched April 4, 1939.**

Hulls Nos. 1467, Panama; 1468, Ancon; and 1469, Cristobal; three passenger and freight steamers for Panama Railroad S.S. Co.; 486 feet x 64 feet x 38 feet 6 inches; 16½ knot speed. Keels laid, Nos. 1467 and 1468, October 25, 1937; No. 1469, November 15, 1937; launching dates, September 24, 1938, December 10, 1938, and March 4, 1939.

Hulls Nos. 1470 and 1471, two 1500-ton destroyers for U. S. Government; delivery dates March, 1940 and May, 1940.

Hulls Nos. 1474, 1475, 1476 and 1477, four freight vessels for American Export Lines, Inc.; 450′ B.P. x 66′ x 42′3″; 16½ knots; geared turbines and water tube boilers. Keel laid No. 1474, November 10, 1938; No. 1475, December 16, 1938; No. 1476, March 16, 1939.

Hull No. 1478, Massachusetts; 35,000 ton battleship for U. S. Navy.

BETHLEHEM STEEL COMPANY, INC.

Shipbuilding Division
Sparrows Point Yard
Sparrows Point, Md.

NEW CONSTRUCTION:

Hulls Nos. 4329, 4330, 4331; three 16,300 dwt. ton tankers for Standard Oil Co. of N. J.; 18 knots speed. Contract signed January 3, 1938.

Hulls Nos. 4332, Mobilfuel, and 4333; two 16,100 dwt. tankers for Socony Vacuum Oil Co. Contract signed February, 1938. No. 4332 launched February 25, 1939.

BETHLEHEM STEEL COMPANY, INC.

Shipbuilding Division
Staten Island Yard
Staten Island, N. Y.

NEW CONSTRUCTION:

Hulls Nos. 8001, Navajo; 8002, Seminole; and 8003, Cherokee—three U. S. Navy fleet tugs. No. 8001, keel laying date December 12, 1938; launching date September 15, 1939; delivery date January 25, 1940. No. 8002, keel laying date December 16, 1938; launching date November 15, 1939; delivery date March 25, 1940. No. 8003, keel laying date December 23, 1938; launching date January 15, 1940; delivery date May 25, 1940.

BOSTON NAVY YARD

Boston, Mass.

NEW CONSTRUCTION:

DD402, Mayrant, and DD403, Trippe, two light destroyers for United States Navy; LBP 334′, beam 35′6″ depth 19′8″; keels laid April 15, 1937; launched May 14, 1938; estimated delivery dates indefinite.

DD415, O'Brien, and DD416, Walke, two destroyers; LBP 341′, beam 36′, depth 19′8″; keels laid May 31, 1938; launching date September, 1939; delivery dates May, 1940, and July, 1940.

DD425, Madison, and DD426, Lansdale, two destroyers; 341′0″ x 36′0″ x 19′8″. Keel laying date December 19, 1938; launching date September, 1939; delivery dates August and October, 1940.

DD433 and DD434, two destroyers, 341′0″ x 36′0″ x 19′8″, contract awarded July 23, 1938. Keel laying date September, 1939; completion dates June and August, 1941.

BROOKLYN NAVY YARD

Brooklyn, N. Y.

NEW CONSTRUCTION:

CL 50, Helena, light cruiser; L.B.P. 600′ beam 61′7¾″, standard displacement 10,000; geared turbine engines; express type boilers; keel laid December 9, 1936; launched August 27, 1938; estimated delivery November 2, 1939.

BB 55, North Carolina, battleship; L.B.P. 714′ 0″, beam to outside armor 108′ 0″, std. displ. 35,000 tons; geared turbine engines; express type boilers. Keel laid October 27, 1937; estimated launching date May 1, 1940; contract delivery September 1, 1941; estimated delivery date October 15, 1941.

CHARLESTON, S. C., NAVY YARD

Charleston, S. C.

NEW CONSTRUCTION:

One harbor tug, Massasoit (YT131); LOA 110′, beam 24′; authorized August 12, 1937; keel laid July 25, 1938; launched December 13, 1938.

One harbor tug, Heekon (YT141); LOA 100′, beam 25′; authorized July 7, 1938.

One harbor tug, Nokomis (YT142); LOA 100′, beam 25′; authorized July 7, 1938.

Four destroyers.

DEFOE BOAT & MOTOR WORKS

Bay City, Mich.

NEW CONSTRUCTION:

Hulls Nos. 72 and 73; two diesel electric harbor cutters for Coast Guard; 110′ x 26′ 6″; powered by 1000 S.H.P. General Motors engines; steel construction. Delivery date April, 1939.

THE DRAVO CORPORATION

Engineering Works Division
Pittsburgh, Pa., and Wilmington, Del.

NEW CONSTRUCTION:

Hulls Nos. 1485-1489, five welded ash removal barges for Dept. of Sanitation, City of N. Y.; 150′ x 37′ x 12′ 9″; 2765 gross tons.

Hulls Nos. 1539-1540, two welded 3 pocket dump scows 115′ x 28′ x 7′ 6″ for stock; 240 gross tons.

Hull No. 1543, one 25-ton floating crane for Navy Dept. Bureau of Yards & Docks; 335 gross tons.

Hull No. 1545, one welded steel hull 125 H.P. workboat for stock; 21 gross tons.

Hulls Nos. 1546-1555, ten welded steel coal barges 175′ x 26′ x 10′ 8″ for stock; 4720 gross tons.

Hulls Nos. 1558-1561, four double bottom cargo barges 195′ x 26′ x 11′ for stock; 2120 gross tons.

Hulls Nos. 1562-1567, six welded flush deck cargo box barges 100′ x 26′ x 6′ 6″ for stock; 990 gross tons.

Hull No. 1568, one pontoon type whirler boat 60′ x 53′ 2″ x 7′ for stock; 188 gross tons.

Hulls Nos. 1569-1572, four welded flush deck cargo box barges 130′ x 30′ x 7′ 6″ for stock; 1000 gross tons.

Hulls Nos. 1573-1574, two welded steel coal barges 134′ x 34′ x 17′ for stock. 1534 gross tons.

Hulls Nos. 1575-1577, three welded steel oil barges 195′ x 35′ x10′ 6″ for stock; 1833 gross tons.

ELECTRIC BOAT CORP.

Groton, Conn.

NEW CONSTRUCTION:

Hull No. 30, Saury (SS189); standard displacement 1450 tons; keel laid June 28, 1937; launching date August 20, 1938; **delivered April 3, 1939.**

Hull No. 31, Spearfish (SS190); standard displacement 1450 tons; keel laying date September 9, 1937; launching date October 29, 1938; delivery date June, 1939.

Hull No. 33, Seadragon (SS194); 1450 tons; keel laying date April 18, 1938; delivery date December, 1939.

Hull No. 34, Sealion (SS195); 1450 tons; keel laying date June 20, 1938; delivery date February, 1940.

Hull No. 35, Tambor (SS198); standard displacement 1475 tons; keel laying date January 16, 1939; delivery date January, 1941.

Hull No. 36, Tautog (SS199); standard displacement 1475 tons; keel laying date March 2, 1939; delivery date March, 1941.

Hull No. 37, Thresher (SS200); standard displacement 1475 tons; keel laying date May 15, 1939; delivery date May, 1941.

THE FEDERAL SHIPBUILDING AND DRY DOCK COMPANY

Kearny, N. J.

NEW CONSTRUCTION:

One destroyer, DD399 Lang, 1500 dis. tons; keel laid April 5, 1937; launched August 27, 1938; **delivered March 29, 1939.**

Two destroyers, DD411 Anderson and DD412 Hammann; keels laid November 15, 1937, and January 17, 1938, respectively; launching date February 4, 1939.

Hulls Nos. 151, 152 and 153, three tank-

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Reciprocating and rotary pumps for marine, industrial and refinery service.

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All types of silencers and spark arresters for gasoline and diesel engines, and air compressors.

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MATSON NAVIGATION COMPANY
THE OCEANIC STEAMSHIP COMPANY
San Francisco Los Angeles San Diego Seattle Portland
SS LURLINE · SS MARIPOSA · SS MONTEREY · SS MATSONIA

ers for Standard Oil Co. of New Jersey; keels laid, No. 151, July 1, 1938; No. 152, July 15, 1938; No. 153, March 13, 1939. **Launching dates,** No. 151, March 4, 1939; **No. 152, April 29, 1939.**

Hulls Nos. 154-159, six C-2 cargo vessels for U. S. Maritime Commission. Keels laid, No. 154, August 25, 1938; No. 155, September 20, 1938; No. 156, January 3, 1939; No. 157, March 16, 1939.

Hulls Nos. 160 and 161, two torpedo boat destroyers for the United States Navy. Keels laid March 1, 1939.

Hulls Nos. 162-167, six C-3 cargo vessels for U. S. Maritime Commission.

Hulls Nos. 168-169, two 6000 ton cruisers for the U. S. Navy.

LEVINGSTON SHIPBUILDING CO.

Orange, Texas

NEW CONSTRUCTION:

One all welded tugboat 80′ LOA, 22′ beam molded, 9′ 6″ depth molded, for W. G. Coyle & Co., New Orleans, La. Powered with 550 H.P. Cooper-Bessemer diesel engine. **Delivered April, 1939.**

MANITOWOC SHIP BUILDING CO.

Manitowoc, Wis.

NEW CONSTRUCTION: **Six hopper barges** 158′ x 26′ x 10′, capacity 800 tons, for Marine Transit Co., Chicago, Ill. Delivery date spring, 1939.

One river towboat 100′ x 25′ x 8′, for Marine Transit Co., Chicago, Ill. Delivery date spring, 1939.

THE MARYLAND DRYDOCK CO.

A Subsidiary of Koppers Company,
Baltimore, Maryland

NEW CONSTRUCTION:

Hull No. 194, single screw steel derrick lighter for U. S. Engineer Office, N. Y. District. LOA 115′ 9⅜″, LBP 110′, beam overall 30′ 8¾″, beam molded 30′, depth molded 11′ 9″, frame spacing throughout 21″, load displacement 438 tons, mean load draft molded 9′ 2½″. Keel laying date October, 1938; launched December 29, 1938; **delivery date April 19, 1939.**

NEWPORT NEWS SHIPBUILDING & DRYDOCK CO.

90 Broad Street, New York

NEW CONSTRUCTION:

H362, light cruiser, CL49, St. Louis, keel laid December 10, 1936; launched April 15, 1938.

Hulls Nos. 363-364, two destroyers, Nos. 413, Mustin, and 414, Russell; keels laid December, 1937; launched December 8, 1938.

Hull No. 369, twin screw mail, passenger and cargo liner for United States Lines Co.; length 723′, beam 92′, depth 45′. Keel laid August 22, 1938.

Hulls Nos. 370, 371 and 372, three oil tankers for Standard Oil Company of New Jersey; gross tonnage about 11,500 tons; L.B.P. 525′, breadth molded 75′, depth molded 39′. Keel laid, No. 370, January 16, 1939.

Hulls Nos. 373, 374, 375 and 376, four single screw cargo vessels for United States Maritime Commission; turbine propulsion; gross tonnage about 9000 tons; length 435′, breadth 63′, depth 40′ 6″. Keels laid, No. 373, November 14, 1938; No. 374, November 28, 1938; No. 375, March 6, 1939.

Hull No. 378, battleship, 58, Indiana, for U. S. Navy.

Hulls Nos. 379, 380, 381, 382, 383 and 384, six single screw combination passenger and cargo vessels for U. S. Maritime Commission; length 465′, breadth 69′ 6″, depth 42′ 6″, gross tonnage about 8000 tons.

THE NEW YORK SHIPBUILDING CORPORATION

Camden, N. J.

NEW CONSTRUCTION:

One destroyer tender for U. S. Navy; order placed December 27, 1937.

One seaplane tender for U. S. Navy; order placed December 27, 1937.

One destroyer tender for U. S. Navy; order placed October 14, 1938.

One seaplane tender for U. S. Navy; order placed October 14, 1938.

One battleship for U. S. Navy; order placed December 1, 1938.

PORTSMOUTH, N. H., NAVY YARD

Portsmouth, N. H.

NEW CONSTRUCTION:

Six submarines, **Sculpin, Squalus, Searaven, Seawolf, Triton and Trout.**

THE PUSEY & JONES CORP.

Wilmington, Del.

NEW CONSTRUCTION:

Hull No. 1070, one steel hopper dredge, Chester Harding; 2,500 cubic yard capacity; length overall 308′2″, length B.P. 300′0″, breadth molded 56′0″, depth molded 29′0″. Contract date February 14, 1938; keel laid May 15, 1938; launched January 20, 1939; **delivery May 10, 1939.**

Hull No. 1071, one steel lighthouse tender, Lilac Class, for Dept. of Commerce, Bureau of Lighthouses. Gross tonnage approximately 700 tons. Keel laid October 17, 1938; completion date July 5, 1939.

Two streamlined diesel tugs for Curtis Bay Towing Company; powered by 320 H.P. Enterprise engines; cost $200,000.

SUN SHIPBUILDING AND DRY DOCK COMPANY

Chester, Pa.

NEW CONSTRUCTION:

Hulls Nos. 173 and 174, two tankers for Standard Oil Co. of New Jersey; steam turbine; 525′ x 75′ x 39′; 16,300 dwt. Keel laying dates May 31 and July 14, 1938; **No. 173 delivered March 23, 1939; No. 174 delivered April 14, 1939.**

Hulls Nos. 175-180, six single screw diesel cargo vessels, C-2 design, for U. S. Maritime Commission; equipped with Sun-Doxford engines. Keel laying dates July 25, 1938; July 26, 1938; August 27, 1938; August 28, 1938; January 14, 1939; March 6, 1939. **No. 175 launched April 22, 1939.** Delivery dates July 4, 1939; September 2, 1939; November 1, 1939; December 31, 1939; March 1, 1940, and May 1, 1940.

Hull No. 181, single screw steam turbo electric drive tanker for Atlantic Refining Co.; 521′ x 70′ x 40′. Keel laid November 21, 1938; delivery date September 1, 1939.

Hulls Nos. 182, 183, 184 and 185, four single screw diesel cargo vessels for U. S. Maritime Commission, C-3 design. Equipped with Busch Sulzer engines. Delivery dates November 15, 1939; December 20, 1939; January 20, 1940, and February 20, 1940.

Hulls Nos. 186-189, four C-3 single screw combination passenger and cargo vessels; diesel propelled; equipped with Sun-Doxford engines. Delivery dates October 6, 1940; December 5, 1940; February 3, 1941, and April 4, 1941.

TAMPA SHIPBUILDING & ENGINEERING CO.

P. O. Box 1838
Tampa, Fla.

NEW CONSTRUCTION:

Hulls Nos. 33-36, four C-2 type cargo vessels for U. S. Maritime Commission; 435′ x 63′ x 31′ 6″; 9291 dwt. tons; diesel powered; cost $1,815,663 each.

DRYDOCK AND ROUTINE REPAIRS: **Sahale, Jos. R. Parrott, Gateway City, U. S. E. D. Dredge San Pablo, Houseboat Bottoms Up.**

Electric Couplings For Diesel Ships

The first order for electric couplings for American built ships has been awarded to the Westinghouse Electric & Manufacturing Company by the Falk Corporation of Milwaukee, Wisconsin.

The contract covers 16 electric couplings, each rated 2230 H.P. at 240 r.p.m. and for installation on 4 diesel propelled cargo ships which the Sun Shipbuilding & Dry Dock Company is building for the U. S. Maritime Commission. There will be 4 Busch Sulzer diesel engines per ship and the electric couplings will be used to connect the engines to the pinion shafts of a two pinion, single reduction gear unit being manufactured by the Falk Corporation.

The principal feature of such an installation is the use of a number of relatively small relatively high speed diesel engines in place of one large slow speed engine. When maneuvering the ship, or when it is more economical to use only a part of the power, the electric coupling provides a means of readily disconnecting one or more engines from the propulsion system.

Although the application is new in this country, electric couplings similar to those now being manufactured by the Westinghouse Company have been successfully applied to several European built vessels and quite recently on 2 Canadian oil tankers, as described in the January, 1939, issue of Pacific Marine Review.

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(Continued from Page 58)

Commander R. S. Field, Bureau of Marine Inspection & Navigation, Washington, D. C.; Homer L. Ferguson, Newport News S.B. & D.D. Co., Newport News, Va.; J. Howland Gardner, Old Lyme, Conn.; W. H. Gerhauser, American Shipbuilding Co., Cleveland, Ohio; Robert L. Hague, Standard Oil Co. of N. J., New York; Robert Haig, Sun S.B. & D.D. Co., Chester, Pa.; Basil Harris, United States Lines, New York.

Willard F. Jones, Gulf Refining Co., New York; R. K. Kelly, Tidewater Associated Oil Co., New York; Lynn H. Korndorff, Federal S.B. & D.D. Co., Kearny, N. J.; Charles Kurz, Pennsylvania Shipping Co., Philadelphia, Pa.; C. Stewart Lee, Pusey & Jones Corp., Wilmington, Del.; Rear Admiral E. S. Land, U. S. Maritime Commission, Washington, D. C.; Roger D. Lapham, American-Hawaiian S.S. Co., San Francisco, Calif.; Joseph T. Lykes, Lykes Bros. S.S. Co., Inc., New York; A. M. Main, Bath Iron Works, Bath, Maine; James J. Maguire, Socony-Vacuum Oil Co., New York; Clifford D. Mallory, C. D. Mallory & Co., New York; Gilbert Mather, Mather & Co., Philadelphia, Pa.; John McAuliffe, Isthmian S.S. Co., New York; Samuel D. McComb, Marine Office of America, New York; John F. Metten, New York S.B. Co., Camden, N. J.; Albert V. Moore, Moore & McCormack, New York; N. O. Pedrick, Mississippi Shipping Co., New Orleans, La.; N. J. Pluymert, Socony-Vacuum Oil Co., New York; L. N. Prior, Bureau of Marine Inspection & Navigation, Washington, D. C.

John F. Purcell, Aetna Insurance Co., New York; Henry H. Reed, Insurance Co. of North America, New York; John D. Reilly, Todd Shipyards, Inc., New York; E. R. Richardson, Ocean S.S. Co., of Savannah, New York; P. M. Ripley, American Sugar Transit Corp., New York; H. Harris Robson, United Fruit Co., New York; Prof. H. L. Seward, New Haven, Conn.; J. E. Slater, Export S.S. Corp., New York; H. Gerrish Smith, National Council of American Shipbuilders, N. Y.; J. Barstow Smull, J. H. Winchester & Co., New York; V. J. Sudman, Black Diamond S.S. Corp., New York; A. C. Sullivan, D. Sullivan & Co., Chicago, Ill.; Henry R. Sutphen, Submarine Boat Corp., New York; J. Herbert Todd, Todd Shipyards, Inc., New York; R. C. Tuttle, Atlantic Refining Co., Philadelphia, Pa.; S. Wiley Wakeman, Bethlehem Steel Co., Quincy, Mass.; H. W. Warley, Ore S. S. Co., New York; A. E. Watts, Sinclair Navigation Co., New York; Capt. Roger Williams, Newport News, Va.; J. M. Willis, Bethlehem Steel Co., Baltimore, Md.; R. E. Wilson, Pan-Amer. Pet. & Transp. Co., New York; William D. Winter, Atlantic Mutual Ins. Co., New York.

Necrology

Again death has removed from our midst a local figure in marine engineering circles, August Mausshardt, veteran marine engineer, who died in San Francisco, California, on April 9, 1939, at the age of 69.

"Gus" Mausshardt was born in San Francisco on April 17, 1870, and served his apprenticeship as a machinist in the shops of Savage & Sons, one of the pioneer marine repair shops of early days. He came of pioneer stock as his father, Conrad Mausshardt, arrived in San Francisco in 1850.

Way back in the 90s saw young Mausshardt gaining his seagoing experience in vessels sailing for such old firms of Goodall, Perkins, Pacific Mail and as one of the first engineers on Robert Dollar's first vessel, the "Newsboy."

Young Mausshardt rose rapidly through all licensed grades from oiler to chief engineer. He was the first engineer of the Ferry Building, which was constructed by his old friend Howard C. Holmes, with whom he closely cooperated through those years of development of San Francisco's harbor.

When the Key System was first started in 1903, "Gus" Mausshardt was selected as their first chief engineer, and succeeded to each new vessel as they were constructed. He was retired by the Key System in 1935 after 32 years of faithful service as chief engineer.

Always of a mechanical turn of mind, "Gus" Mausshardt's hobby was automobiles. He had one of the first automobiles ever to be assembled and to run about the streets of San Francisco. This hobby was widely recognized, and many automobile designers presented their innovations for his approval.

He was always quick to recognize ability in younger men just starting in the marine field, and many of the present day marine engineers owe their early mechanical training to his untiring efforts to advance the marine engineering profession, and his friends among the fraternity were legion.

The sudden passing of "Gus" Mausshardt was a distinct shock to those in the marine engineering fraternity on the Pacific Coast, especially those of the older school. He is survived by his widow, a son, Milton Mausshardt; a sister, Mrs. W. H. Breeding, and a brother, Ed Mausshardt, Pacific Coast district manager of the U. S. Maritime Commission.

The Merchant Marine has lost another old-timer and the marine fraternity of the Pacific Coast mourns the passing of a true friend.

CAPT. JOHN O. YOUNGREN

On April 23 Capt. John O. Youngren, veteran Matson shipmaster, passed away in San Francisco following a long illness. He was well known to thousands of travelers voyaging with him on the old steamer Enterprise and other Matson ships. He was once skipper of the schooner Snow & Burgess and also commanded other square riggers.

CAPT. EUGENE P. RIDEOUT

After navigating steamships on the Pacific and in its bays for half a century, Capt. Eugene P. Rideout passed away on April 7. He came originally from Oldtown, Maine, and early in his career operated one of the sternwheelers plying between San Francisco and Marysville. He became known to hundreds of people in bay and river transportation, and served with Southern Pacific for some twenty years.

When the World War came, Capt. Rideout served as quartermaster captain of transports on the Atlantic. He passed away at Veteran's Hospital, Fort Miley, after an illness of two weeks at an age of 79.

PACIFIC MARINE REVIEW

JUNE, 1939

ials of the United States Maritime Commission and others at the shipbuilding plant of the Moore Dry Dock Company, nd, Calif., to inspect construction of two C-3 type freighters — dimensions, 492' 0" x 69' 6" and 11,926 deadweight tons May 5, 1939.

Front row: Commander H. L. Vickery, assistant to the chairman, U. S. Maritime Commission; James French; Jos. A. Moore; J. L. Bates, director of technical division, U. S. Maritime Commission ● Second row: Frank H. Evers; E. C. Mausshardt, district manager, U. S. Maritime Commission; Austin Sperry; Roy S. Folger; W. E. Spofford, sen. naval architect, U. S. Maritime Commission; H. E. Kennedy; W. B. Warren ● Third row: Jos. A. Moore Jr.; James R. Moore; David Currier, inspector, U. S. Maritime Commission ● Back row: Nat Levy; Harry Fawke; Philip Coxon; C. D. Mues.

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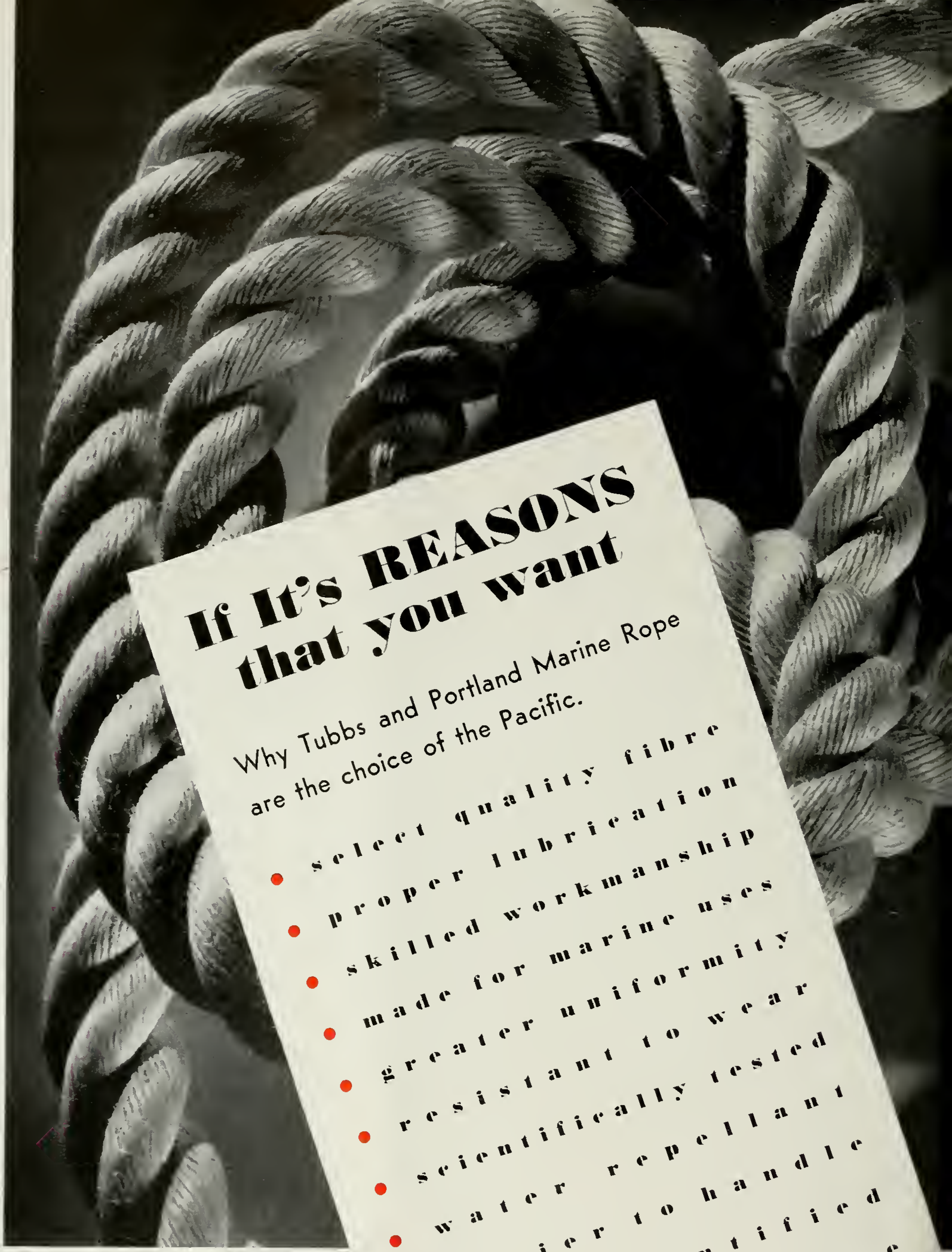

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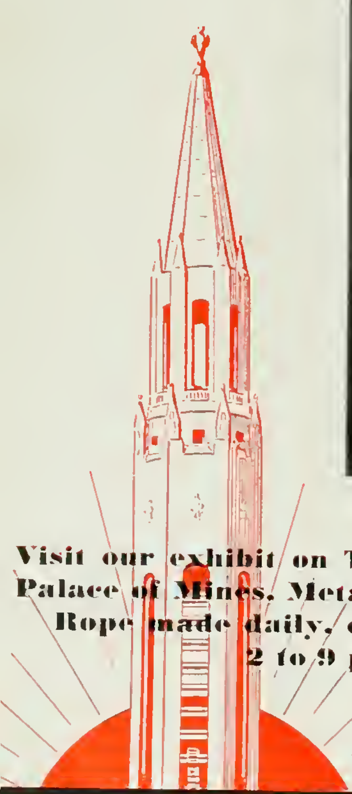

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PACIFIC MARINE REVIEW

JUNE, 1939

Official Organ

Pacific American Steamship Association

Shipowners Association of the Pacific Coast

TABLE OF CONTENTS

Editorial Comment:
Shipbuilding Progress 23
Moore Yard Makes Progress 24
Your Problems Answered 30
By "The Chief."
Steady As You Go! 33
Air-Borne Damage to Sea-Borne Cargoes.
VII New Methods of Cargo Ventilation.
By Oliver D. Colvin, Werner H. E. Hahne and Mark R. Colby.
U. S. Lighthouse Service 36
A Modern Fireproof Cannery Steamer 38
Robert F. Hand New General Manager of Marine Department, Standard Oil Company of N. J. 42
Window Installations on Panama Railroad Liners 45
S.S. Taku Enters Alaska Service 46
By Charles F. A. Mann.
Puget Sound Orient Line Begins Operations 48
On the Ways 50
Latest News from American Shipyards.
A Modern Marine Refrigerating and Air Conditioning Plant 60
Deck Auxiliaries on Most Modern American Steamer 62
Building in American Yards 66
Miscellaneous: Engineers' Licenses, 32; A Water System and a Bilge Pump, 40; Fire Extinguishing System on Most Fireproof Ship Afloat, 41; Deaerating Feed Water Heaters, 41; Fiberglas Insulation on New Liner Panama, 44; Literature of the Industry, 44; Naval Architects Win Naval Award, 45; New Small Snap-Action Limit Switch, 48; Deck Officers' Licenses, 52; Change of Masters, 54; Mechanical Ferrets for Cleaning Pipes, 64; New Portable X-Ray Flaw Detector, 64; Universal Pitchometer Patented, 64; A New Duplex Welding Hose, 64; Coast Survey Schedules, 70.

PUBLISHED AT 500 SANSOME STREET . . . . SAN FRANCISCO

Entered as second class matter June 20. 1913, at the post office, San Francisco, under the Act of March 3, 1879. Published on the 1st of each month. Advertising and editorial forms close on the 15th. Subscription price, one year: Domestic, $1.50; foreign, $2.50; two years: Domestic, $2.50; foreign, $4.00: three years: Domestic, $3.00; foreign, $5.50; single copies, 25c. Chas. F. A. Mann, Northwest Representative, 1110 Puget Sound Bank Bldg., Tacoma, Washington. New York Office, Suite 404-405-406, Two Hundred Broadway, Telephone COrdlandt 7-3579.

In New York City copies of Pacific Marine Review can be purchased at the news stands of I. Goldberg, 42 Broadway; Harry Nash, 17 Battery Place; Philip Mandara, Greenwich Street and Battery Place. In Washington, D. C., at the news stand of the Carlton Hotel, 16th and K Streets.

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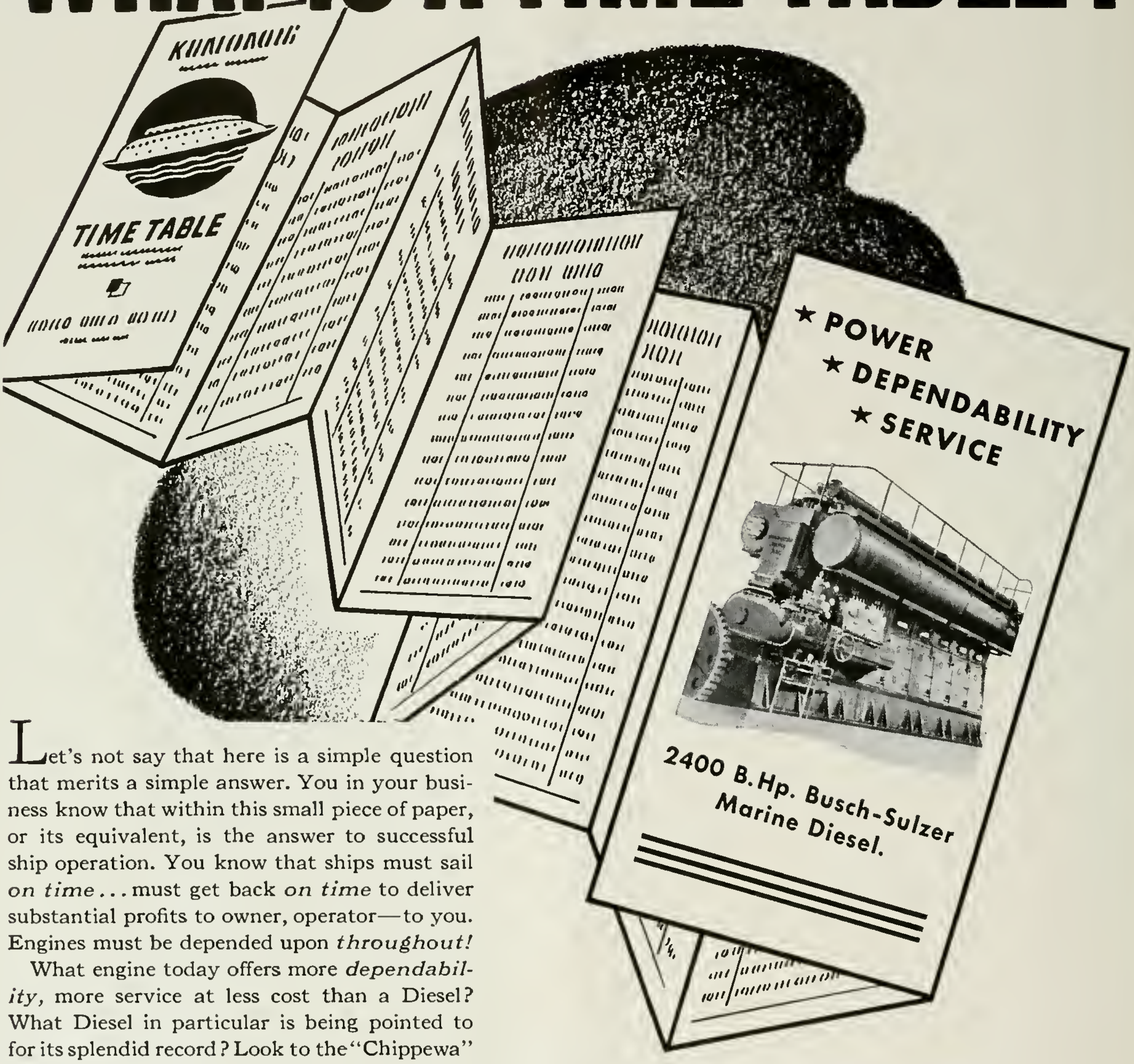
WHAT IS A TIME TABLE?



Let's not say that here is a simple question that merits a simple answer. You in your business know that within this small piece of paper, or its equivalent, is the answer to successful ship operation. You know that ships must sail *on time* . . . must get back *on time* to deliver substantial profits to owner, operator—to you. Engines must be depended upon *throughout!*

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PACIFIC MARINE REVIEW

VOLUME XXXVI JUNE, 1939 NUMBER 6

Shipbuilding Progress

In the year 1938 the United States witnessed a great growth in the shipbuilding business. The recent report of the National Council of American Shipbuilders presents statistics for vessels of 1000 (gross for merchant, displacement for Government) tons and over, as follows:

	Merchant Vessels		Government Vessels	
	Number	Gross Tons	Number	Disp. Tons
Under construction January 1, 1938	32	235,250	36	143,680
New contracts placed during the year	55	482,204	15	136,920
Vessels delivered during the year	28	183,450	13	72,900
Under construction December 31, 1938	59	534,004	38	207,700

Between January 1 and April 1, 1939, the following contracts to private shipyards:

Six C-3 cargo-passenger vessels with the Newport News Shipbuilding and Dry Dock Co.; four C-3 cargo-passenger vessels with Sun Shipbuilding and Dry Dock Co.; four C-3 cargo vessels with the Ingalls Iron Works; two 6,000 ton light cruisers with the Bethlehem Steel Co. (Fore River); two 6,000 ton light cruisers with the Federal Shipbuilding and Dry Dock Co.; one 20,000 ton airplane carrier with Newport News.

Thirty-seven seagoing merchant ships and twenty-one naval vessels comprise the presently contemplated shipbuilding contracts for the 1939 period from April 1 to December 31.

As reported by the chairman of the Maritime Commission, the merchant ships are:

Five cargo vessels for Lykes Brothers Steamship Co.; three cargo-passenger vessels for Mississippi Shipping Co.; three cargo vessels for New York & Cuba Mail Steamship Co.; one passenger vessel for New York & Cuba Mail Steamship Co.; five cargo vessels for South Atlantic Steamship Co.; three passenger vessels for South American trade; three passenger vessels for Pacific trade; twelve oil tankers; and two C-3 cargo vessels.

The balance of the proposed 1939 naval program consists of the following vessels: two 45,000 ton battleships; eight 1,620 ton destroyers; six 1,450 ton submarines; two 900 ton baby-submarines; two seaplane tenders; and one repair ship.

This represents a huge addition to the present work. In both naval and merchant vessels there are items indicating larger ships than any heretofore built in America.

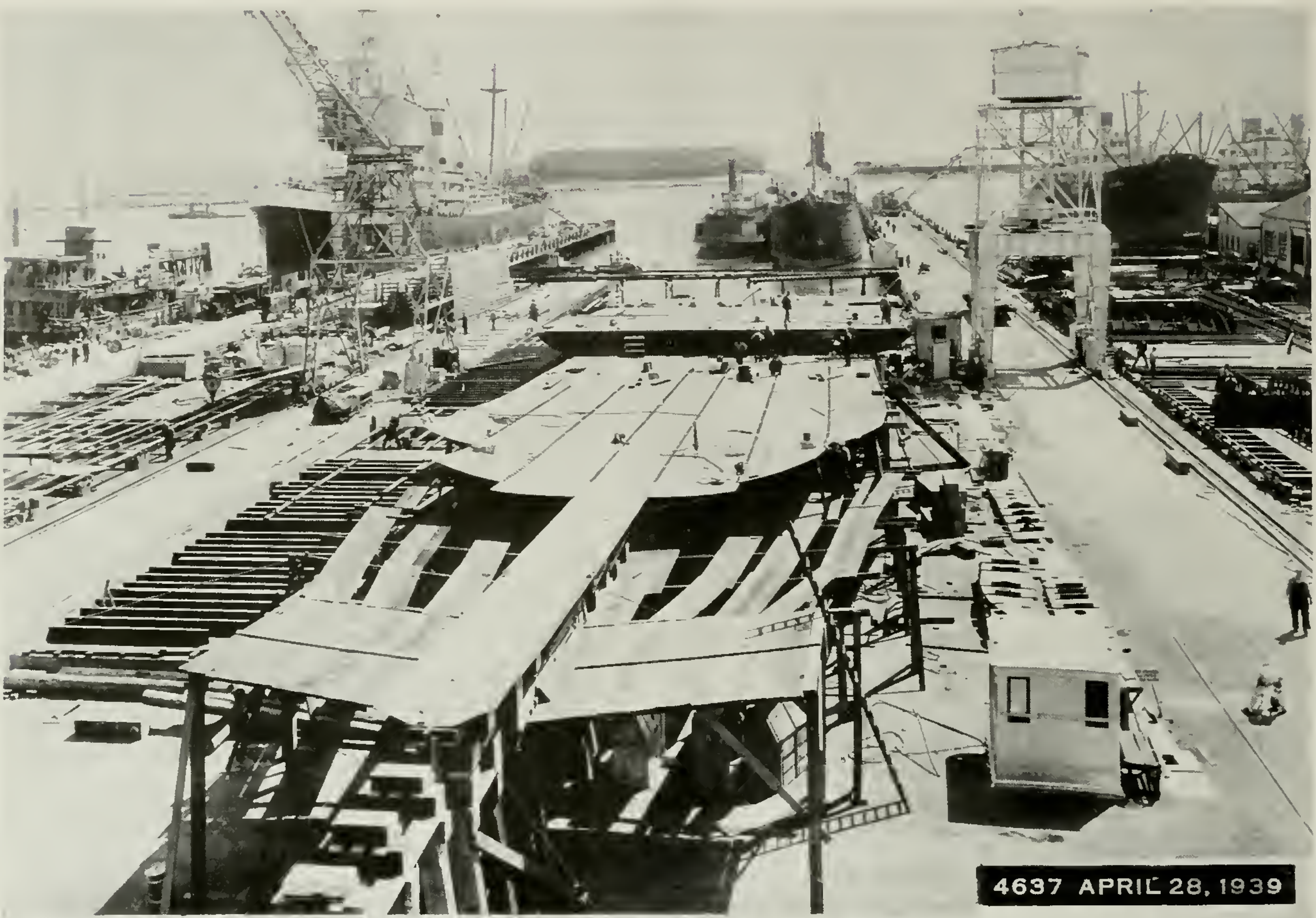
The 45,000 ton displacement battleships, for instance, will be the largest of that type in the U. S. Navy. Reports on the passenger vessels for Pacific trade and those for South American trade indicate 45,000 to 47,000 gross tons, so that the total for these six vessels alone adds 282,000 gross tons to the aggregate volume of the shipbuilders' prospects for 1939.

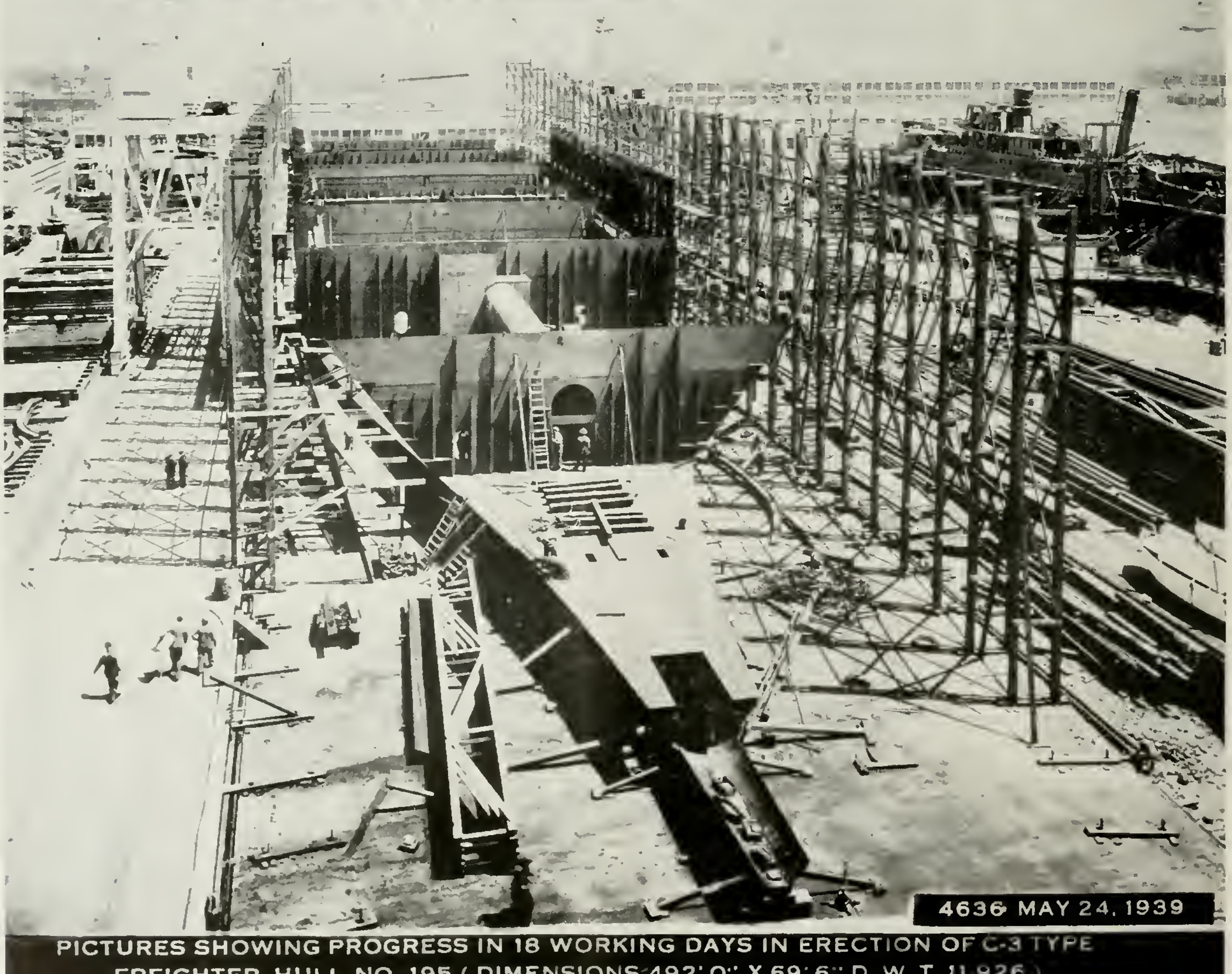
Some of these contracts have been awarded since April 1, but the great majority are still to come.

Lloyd's Register Shipbuilding returns for the quarter ending March 31 records the fact that the United States, with 104 vessels, aggregating 120,931 tons under construction, was second among the world's shipbuilding nations. Great Britain and Ireland was first, with 129 ships, measuring 596,903 tons; and Germany third, with 125 ships, and 381,304 tons. Next in order were Japan, Holland, Italy, Denmark and Sweden.

Considering the importance of the Pacific Ocean trade routes to the United States, would it not be a wise action for the President and the U. S. Maritime Commission to allocate more of this naval and commercial shipbuilding to the private shipyards on the Pacific Coast?

18 Days' Progress at Moore's Yard





PICTURES SHOWING PROGRESS IN 18 WORKING DAYS IN ERECTION OF C-3 TYPE
FREIGHTER, HULL NO. 195 (DIMENSIONS 492' 0" X 69' 6" D. W. T. 11,926)
BY THE MOORE DRY DOCK COMPANY. OAKLAND. CALIF., MAY 24, 1939 4662

The New TECHNIQUE IN SHIPBUILDING

Moore Dry Dock Company Makes Remarkable Progress in Fabricating and Erecting Hulls For C-3 Standard Cargo Vessels

This is an article in which the story is told mainly by the pictures, the text being just a little bit of continuity and an explanation of the factors back of the progress shown by the illustrations.

On December 23, 1938, the U. S. Maritime Commission awarded the Moore Dry Dock Company a contract to build two C-3 type standard cargo vessels at a price of $2,857,760 for each vessel.

The organization at the yard immediately began preparing the building ways and securing adequate weight lifting, welding, and other equipment according to definite plans that were developed before this contract was undertaken.

A concrete girder platform was laid over the pile foundations of the old shipbuilding ways allowing ample room at one side for welding large assemblies of ship structure.

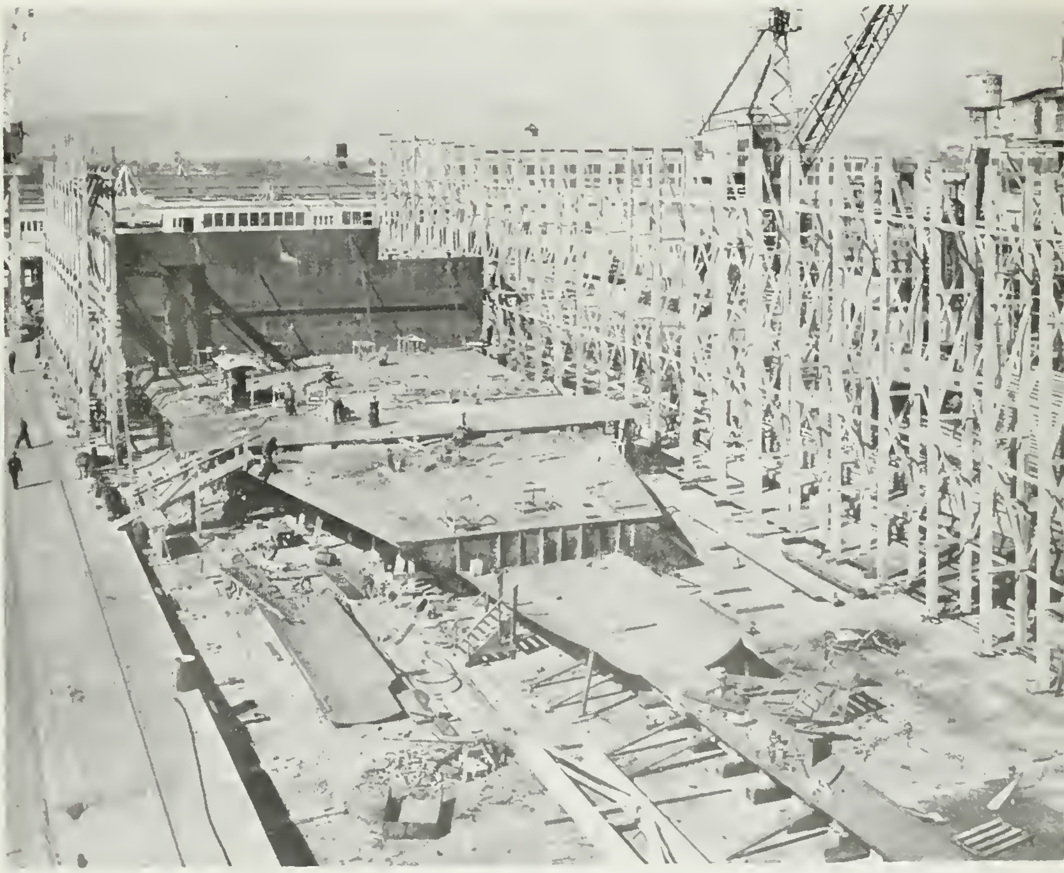
The crane trackage was realigned to meet the requirements of the new building way and of the assembly platform. A new Clyde 50-ton Whirley was purchased and installed. Pneumatic piping, gas piping, steam piping and electric power and light cables were installed, with numerous outlets conveniently located.

On March 3 the final formalities in connection with contractors' bonds were completed to the satisfaction of all the parties concerned. On March 18 the keel for the first C-3 vessel was laid. On April 24 the first large assembly of double bottom structure was swung into place by the new crane and welded to the bottom shell. After that event, the illustrations show how erecting progress began to accelerate so rapidly that old Pacific Coast shipbuilders just "can't believe it even when they have seen it."

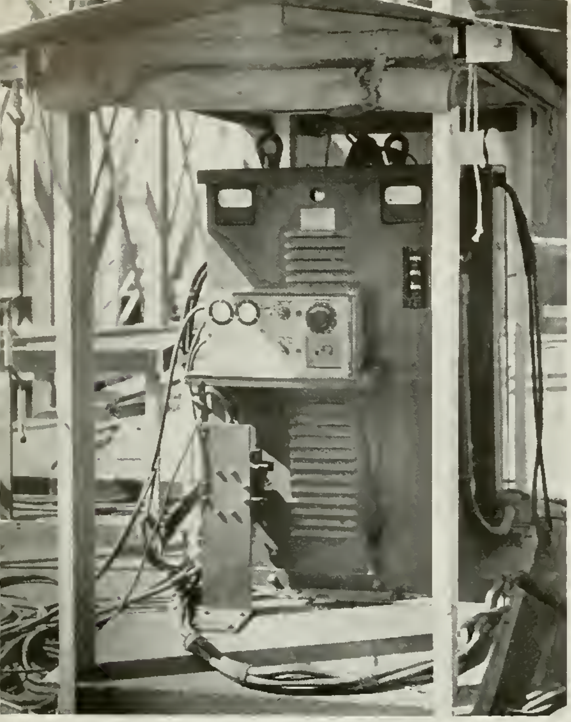
Back of this progress, of course, is the enthusiastic cooperation of the Moore organization under the inspiring personal leadership of Joseph A. Moore. Back of it also are the tremendous improvements that have been made in welding and weight handling technique during the past few years.

Welding as now used in new ship construction is a development of the past decade, and since no large seagoing vessels have been built in Pacific Coast yards for the past 17 years this application of welding technique is entirely new in Pacific Coast shipyards. The design and specifications for the hulls of the C-3 standard ships of the U. S. Maritime Commission are based on riveting all longitudinal seams and butt welding all transverse joints of the shell plating and weather deck plating, and on welding all internal seams and joints. This allows the assembly, by welding on horizontal welding platforms, of whole bulkheads with their stiffeners or of large areas of the tank tops with floors and intercostals attached. These assemblies are lifted by the cranes, spotted in the ship, and tack welded in place.

In welding the seams of bulkhead or tank top plates, running fillet



This picture, taken May 15, is intermediate to the two pictures on facing page.



Resistor-reactor control unit for Unionmelt welding process.

welds attaching stiffeners to these bulkheads, attaching bulkheads to tank tops, or in any welding operation where an automatic welding head may be used to advantage, the Moore Dry Dock Company is using the "Unionmelt" welding process as developed by The Linde Air Products Company. It is an interesting fact that this process was discovered and invented by Dr. Hugh A. Studdert Kennedy of Berkeley and sold by him to The Linde Air Products Company. Dr. Kennedy has been keenly interested in the application of his process at the Moore yard and very helpful in smoothing out some of the kinks and in helping to train operators.

"Unionmelt" welding is an electric process using the heat generated by the passage of an electric current from an electrode to the work being welded. The end of the electrode is constantly covered by a highly resistant, conductive medium supplied as a special granulated material or welding composition known by its trade-mark "Unionmelt."

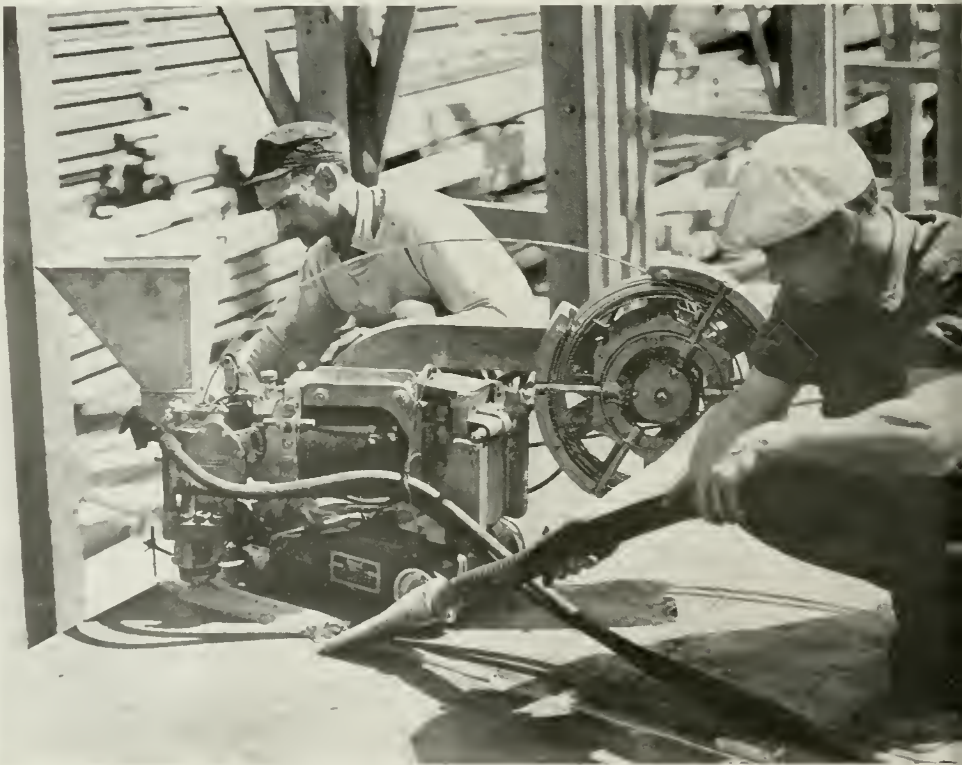
This granulated material is laid down along the seam to be welded, and the entire welding action takes place beneath it, without an open, visible arc, and without sparks, spatter, smoke, or flash. Within the layer of "Unionmelt," an intense, concentrated heat is generated by the electric current, and the bare metal electrode and a portion of the edges being welded are melted and fused. Molten metal from the electrode is thoroughly mixed with the melted base metal to form the weld. When a weld is being made, a subsurface layer of "Unionmelt" melts and floats as a liquid blanket over the molten weld metal.

The "Unionmelt" welding composition performs several important functions. It makes possible the use of higher current densities than for other welding methods. This permits the rapid generation of the intense heat which melts the metal. It is a good heat insulator and thus concentrates the heat in a relatively small welding zone. It acts as a cleanser for the weld metal, washing the metal which melts from the rod, and absorbing impurities from the fused base metal. It excludes the atmosphere and other gases from the weld metal. Consequently, the weld metal is exceptionally clean and dense, and has excellent physical properties, unusual for large weld-metal deposits. Though the constituents of "Unionmelt" do not normally enter into the weld metal, special alloying elements can be introduced into the weld metal by means of this material.

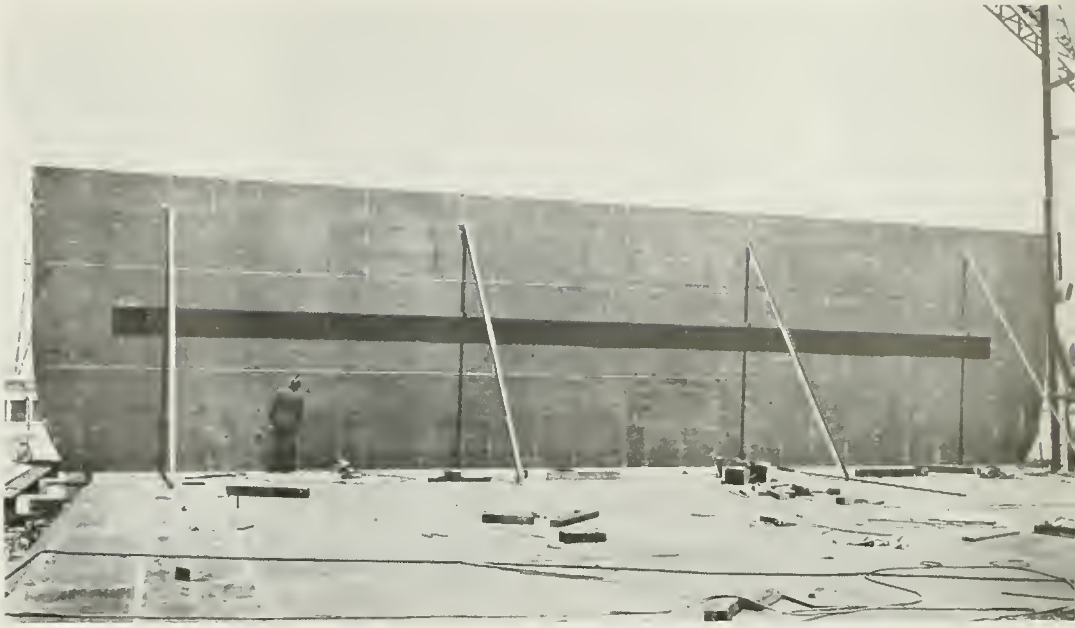
In operation, the "Unionmelt" welding process is fully automatic. Since the granulated material is not a conductor of electricity when it is cold, a special "fuse"—a wad of steel wool, for example—is used to start the weld. The fuse is covered with "Unionmelt" and, when welding current is turned on, the fuse becomes sufficiently hot to melt the adjacent layer of "Unionmelt," which permits the welding operation to continue. The welding composition is progressively fused by the heat generated as the weld proceeds.

Bare welding rod is continuously fed from a special rod reel into the welding zone by the "Unionmelt" welding head. "Unionmelt" fed through the welding head is progressively laid down along the seam to be welded a few inches in front of the rod. Since only part of the "Unionmelt" is fused during the welding, the unfused material is picked up, usually by a "suction cleaner," and returned to a hopper for re-use. The fused melt solidifies behind the welding zone and, on cooling, contracts and detaches itself, exposing the clean, smooth weld.

Welding voltage, current, speed, and rod feed are all automatically regulated by electrical controls. Welding voltage is held at the predetermined value by the adjustable,



Automatic welding machine for Unionmelt welding process and vacuum nozzle following to pick up spare Unionmelt flux material.



A transverse bulkhead welded complete and spotted in hull held by temporary bracing.

automatic "Unionmelt" voltage control which governs the rod feed. Voltage, current, speed, rod feed, and rod size depend on the material being welded, its thickness, the type of edge preparation being used, the depth of fusion desired, and the shape and reinforcement of the weld specified. All of these factors can be regulated within practical limits.

The operator merely pushes buttons or adjusts controls. Aside from the continuous feed of the welding electrode and the movement of the welding head, there is no visual evidence that a weld is being made.

For one pass butt welds in 7/16 inch low carbon steel plate this process uses ¼ inch rod with 1000 to 1100 amperes, and makes perfect welds at the rate of 2 feet per minute.

The same type of weld in 1 inch steel plate requires 1500-1600 amperes, 5/16 inch rod, and the speed reduces to 12 inches per minute.

Special heavy duty high current motor generating sets were designed and built by Westinghouse for use with the Unionmelt welding process.

This equipment consists of a transformer reactor welding unit in which the secondary current is regulated by motor-operated reactors, and the primary is energized and de-energized to start and stop the welding process. The control for the transformer welding unit is assembled in a floor-mounted cabinet which is contained in a steel frame fitted with a permanent four-point sling so it can be spotted as near the work as practicable.

The welding process is started and stopped from a control switch at the welding head and the current setting of the transformer may be made from a push button station.

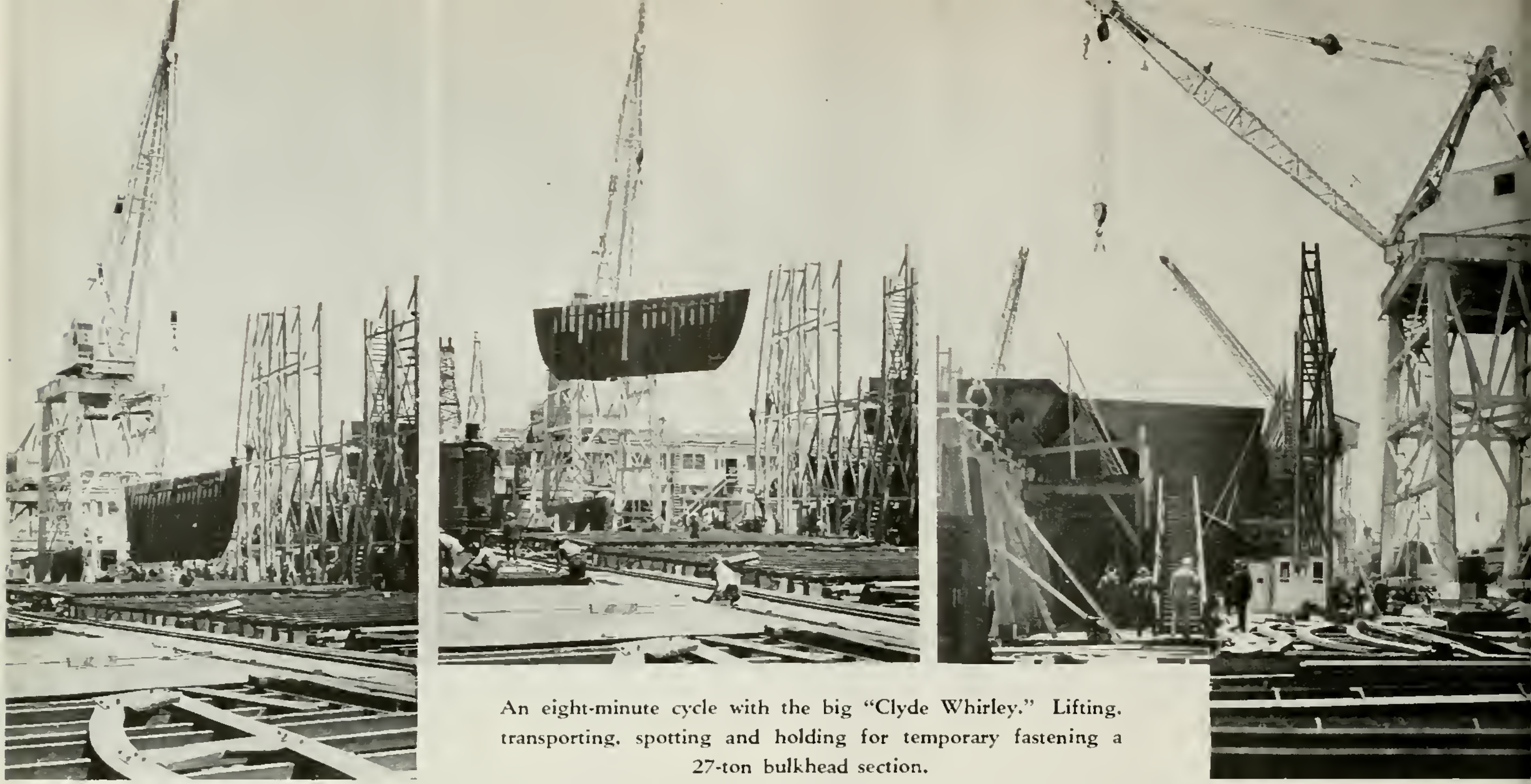
The motor generator unit has integral core construction, the primary and secondary windings being assembled on one leg of the core. The reactor winding is separate from the main transformer windings and mounted on the same core structure directly above the transformer windings with the axes of all coils in a vertical line.

A movable core is fitted inside the reactor coil and completes the magnetic circuit of the core structure through a variable air gap. A heavy shaft passes axially through the core, and rotation of this screw shaft changes the position of the core, moving it up or down, within the coil according to direction of rotation. This variance of the reactance is done through use of a single-phase, 110-volt capacitor type motor and gear reducer, providing complete motor operated remote current control.

The welder is supplied with necessary plugs and receptacles for making the 110-volt power connection to the operating motor. A three-wire receptacle is fitted on the welder to provide a plug-in connection for receiving the three-wire control lead from the remote control station. This eliminates need for opening up the welder case for making connections.

All windings are of asbestos insulated conductor. The reactor winding is of special low-loss stranded cable and is insulated with asbestos. The welding unit is equipped with flush mounted ammeter and voltmeter.

Reverse side of above bulkhead and a part of center line bulkhead, showing stiffening members.



An eight-minute cycle with the big "Clyde Whirley." Lifting, transporting, spotting and holding for temporary fastening a 27-ton bulkhead section.

This welding unit will be of the 1000-ampere capacity size suitable for operation on 440-volts.

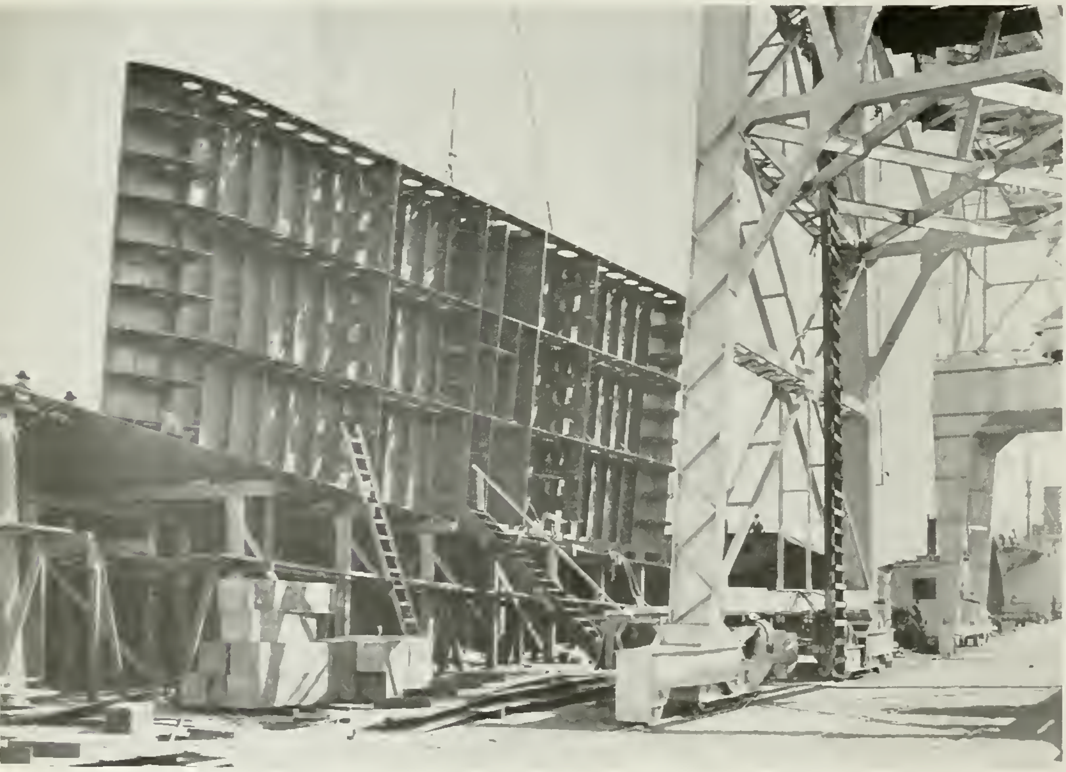
Economic assembly of a ship's hull by the welding process requires a large area of platform adjacent to the slip. On this platform is fitted a large grid of steel channels, or rails. The steel members of the hull are laid out on this platform in their proper relation and welded together in large assemblies. For a ship of the C-3 type these assemblies weigh from 10 to 55 tons.

In order to handle these large weights with speed, accuracy and safety the Moore Dry Dock Company installed a Clyde Whirley, which can handle 50 tons on a close up lift. This, in combination with several other gantry cranes that were already operating in the yard, enables the operators to lift, reverse, transport and spot weights up to 60 tons in sizes up to 35 feet in height and 70 feet in width.

This Clyde Whirley is a traveling, full revolving, long reach, heavy duty steel derrick . . . simple, reliable, economical and versatile.

The upper or full rotating frame supports the "A" frame, boom, power machinery, machinery cab and operator's cab. The "A" frame consists of four legs which form a rigid truss with the rotating platform. The boom is of tubular steel lattice with Man-Ten chord angles. The boom length is 80 feet with a 5-foot whip line extension. Capacities are 40 tons at 35 feet, 12½ tons at 80 feet, 10 tons at 85 feet.

Power is derived from the 3-drum, 100-horsepower electric hoist with a 11,000-lb. linepull at 250 f.p.m. Swinging is accomplished by a 50 horsepower independent electric swinger which drives through spur and bevel gearing to the bull gear. The swinging speed is 1 r.p.m. The complete rotating structure is supported on a 24-foot diameter rail circle by 8 large diameter wheels mounted in pairs of equalizing carriages. This is to prevent individual wheel overloading. The rail circle

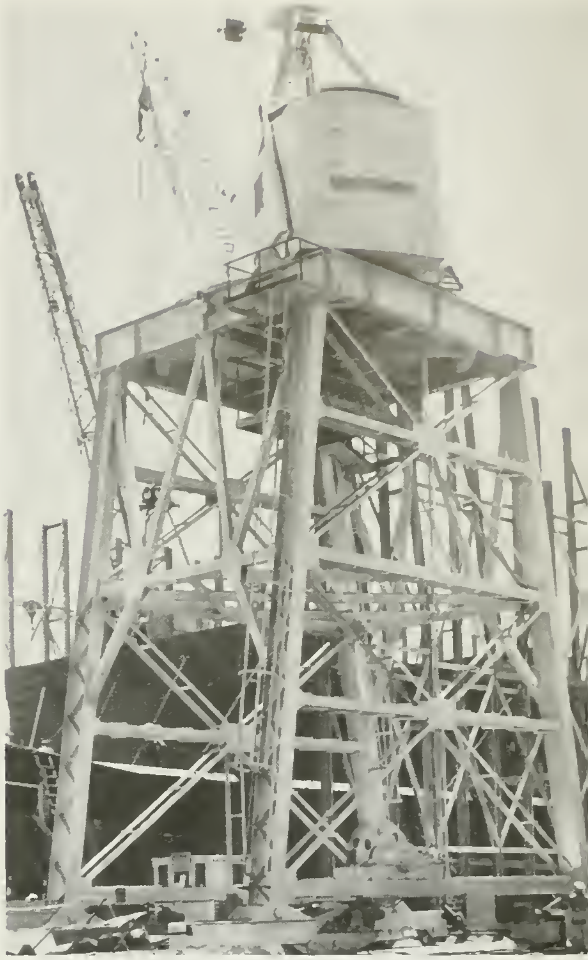


A 52-ton section of tank top with all floors and intercostals welded in place being swung into position on bottom shell plating.

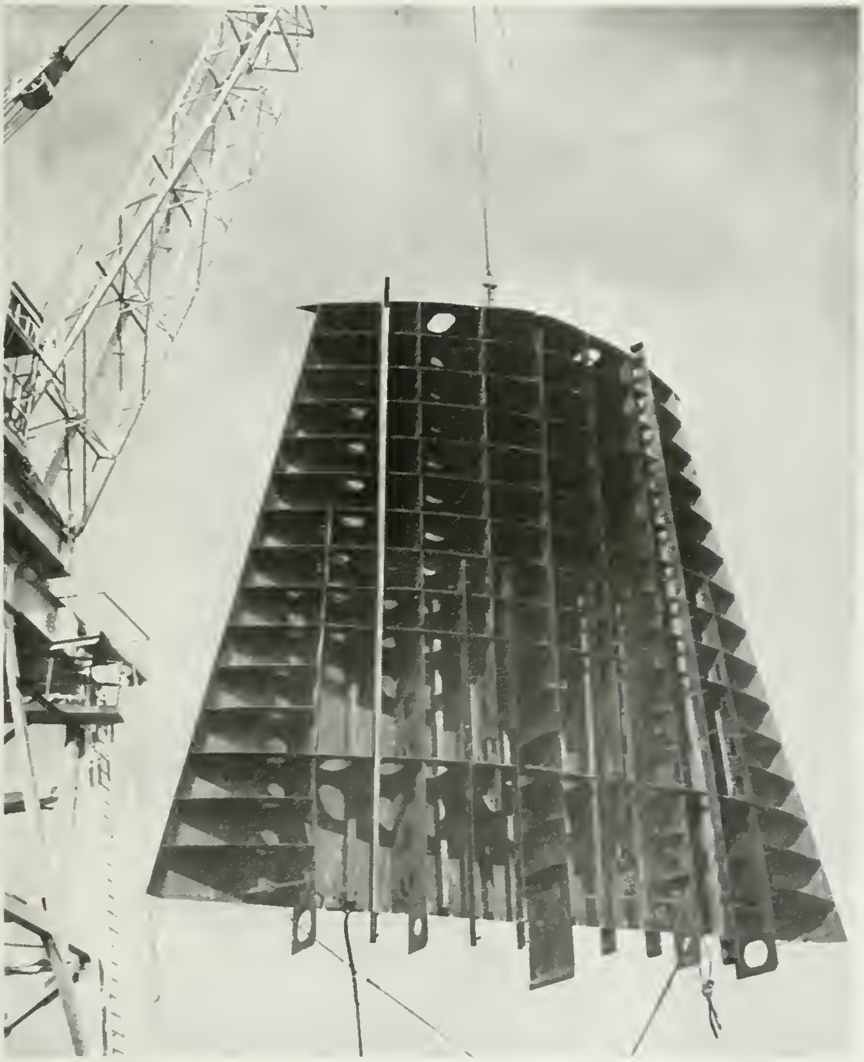
with the bull gear and center pin are mounted on the lower frame which forms the base for the rotating superstructure. A steel gantry carries the base and upper frame at an elevation of 53 feet from the track rails to the boom hinge pin. This gantry is mounted on four self-propelling trucks. Each truck consists of three equalized wheels and each truck is independently propelled by an electric motor. The traveling speed is 100 f.p.m. A torque motor driven portable cable reel automatically takes up the slack in the electric power line as the machine moves in either direction.

Such rapid progress at the Moore yard is heartening to Pacific Coast shipbuilders. It is not the purpose of this article to make detailed comparisons with the progress on similar ships in yards on the Atlantic Coast, but we can say this: Thus far the Moore Dry Dock Company progress on this C-3 vessel is equal to the best progress made in the best yards and it does not yet satisfy the Moore organization.

The key men in the Moore yard say, "This progress is fair, but how much better it would be if we could get the steel a little faster"; or, "You think this is good? Wait till you see the second ship go up!"



A close-up of the new "Clyde Whirley," showing automatic take-up reel for power cable and articulated separately-driven gantry trucks.

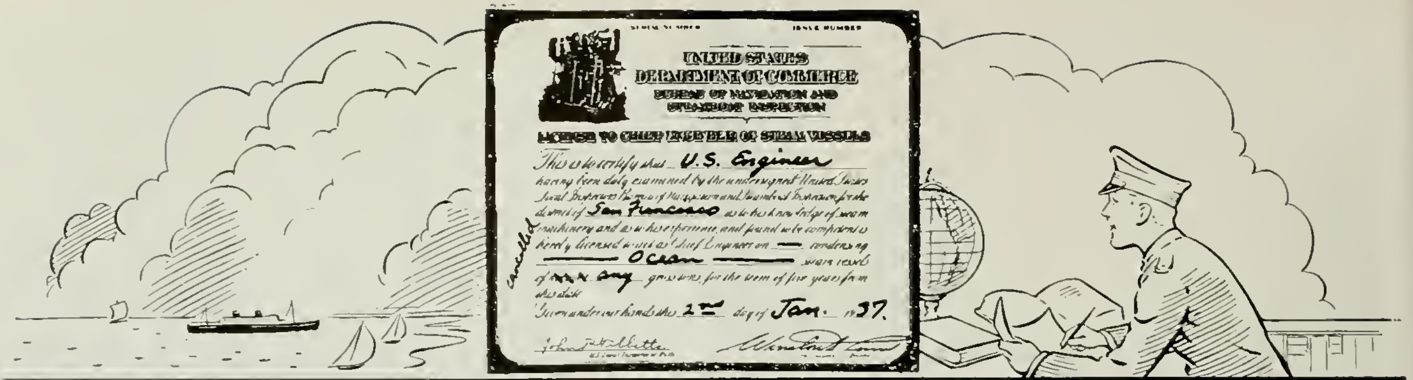


Close-up of section of double bottom.

Late Flashes

As we go to press comes the news that the U. S. Maritime Commission has completed the plans and specifications for its C-1 type standard cargo vessel. On May 2 these were mailed from Washington to interested Pacific Coast shipyards, and all the estimating departments are rolling up sleeves and sharpening pencils preparatory to a real battle of figures. Here's hoping Pacific Coast gets all of this first batch of the Commission's baby ships.

Captain H. W. Rhodes, for many years Superintendent of the 18th District, U. S. Lighthouse Service, San Francisco, announces his retirement from active duty effective July 1, on which date the Lighthouse Service, after 150 years of existence as a distinct organization, will lose its identity by being merged with the Coast Guard.



UNITED STATES
DEPARTMENT OF COMMERCE
BUREAU OF NAVIGATION AND
STEAMBOAT INSPECTION

LICENSE TO CHIEF ENGINEER OF STEAM VESSELS

This is to certify that U.S. Engineer

San Francisco

Ocean

any

Given under our hands this 2nd day of Jan. 1937.

Cancelled

Your Problems Answered

by "The Chief"

The word "Cancelled" was inscribed on face of the above license at the direction of the Bureau of Marine Inspection and Navigation. As used here it means "Specimen Copy."

AUXILIARIES V

THRUST BEARINGS

Question: How can the thrust load on the thrust bearing surfaces and thrust blocks be figured?

Answer: The thrust is calculated from the familiar formula for horsepower:

$$HP = \frac{T \times S}{33{,}000}$$

From this is readily derived the formula for thrust:

$$T = \frac{HP \times 33{,}000 \times 60 \times E}{K \times 6080},$$

when HP = horsepower on shaft, T = thrust in pounds, S = speed of ship in feet per minute, K = speed of ship in knots, E = efficiency of the propeller, which may be taken at 70% if not known.

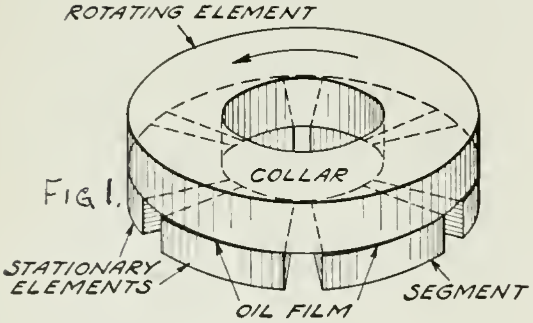
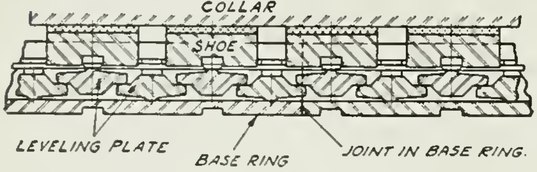


FIG 1.

FIG 3.



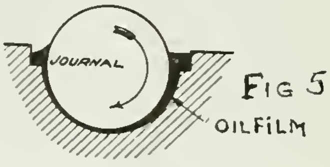


FIG 5

For example: Suppose an oil tanker with nominally 3,000 horsepower on the shaft is making 12.5 knots with propeller of 70%, or .7 efficiency and a slip of 20%. The thrust then would be 54,700 lbs., or over 27 tons.

The thrust load in pounds per square inch would be this total thrust divided by the area of contact of the thrust bearing.

Thus, if this tanker had a multi-collar horseshoe type of thrust bearing, with 10 thrust collars, each presenting 160 sq. inches area, we would have 1600 sq. inches total, or slightly more than 34 lbs. per sq. inch thrust load. This is about the limit thrust load for this type of thrust bearing.

Question: What are the several types of thrust bearings?

Answer: There are two principal types of thrust bearings, i. e., the multi-collar horseshoe type, limited to about 40 pounds per sq. in. unit loading; and the Kingsbury type, which usually does not exceed 400 pounds per sq. in. unit loading.

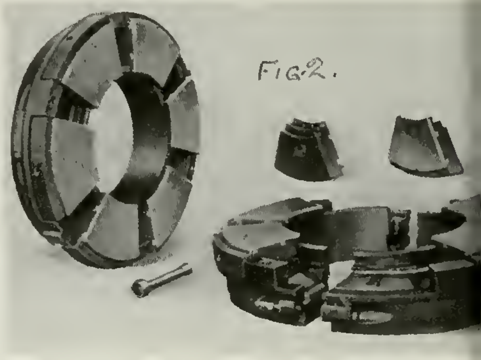


FIG. 2.

Question: What is the basic principle of lubrication of thrust bearings?

Answer: The fundamental principle of liquid lubrication to give liquid friction only is that of keeping the moving part away from the stationary by a film of lubricant, generally oil.

It is simple enough to introduce the oil between the surfaces under load by having suitable grooves or channels placed at approximately right angles to the direction of motion, thus entering the oil into or under an advancing rounded edge. Once trapped between the two surfaces, the space for oil is reduced to a close clearance and the oil is loaded and subjected to a squeezing action. The oil escapes under the influence of the pressure built up, and in so doing relieves the pressure so that if the sufaces are parallel to each other the load will be carried on that area just following the advancing edge, the remainder of the area carrying little or no load because of loss of oil.

If the clearance between the two loaded surfaces could be reduced as the oil squeezes out so that the pressure would be maintained, then the load would be distributed.

Question: Can the babbited surface be machined to give the gradual reduction in oil clearance?

Answer: For light oils or hot oils with lowered viscosity the rate of oil loss from between the surfaces is more rapid than for heavy or cold oil. Thus the clearance between the surfaces would have to be reduced more rapidly in the former than in the latter case. It is difficult but still possible to machine the surfaces to give this tapering clearance, but this would be but for only one viscosity, and for others would not be so suitable.

Question: What is the principle of the Kingsbury thrust bearing?

Answer: The Kingsbury bearing places the several segments of the stationary surface on a swivel or rocking edge so that the oil clearance may adjust itself to the desired value, thus with hot oil the wedge is more sharply tapered than with cold oil when it flattens out somewhat.

Figure 1 shows the wedge shape of the oil film as well as the rotating elements above and the six segments of the stationary elements. These segments are called thrust shoes.

Figure 2 illustrates a thrust assembly, showing the shoes both assembled on the left, and partialy dismantled on the right.

Figure 3 is a developed section, schematic only, showing the method of pivoting or rocking the shoes. Shown also are the equalizing rockers used to equalize the load on all shoes. This is desirable when more than three shoes are used.

Thus, with the self-adjusting wedge-shaped oil clearance the load is divided uniformly over the surface of the shoe, and with the equalizing rockers the load on the shoes is uniform, so that the entire bearing loads the oil film to an equalized value.

This is the reason that such high unit loadings may be safely used.

Question: What maximum unit pressures have been observed?

Answer: Tests have been made on a 3500 r.p.m. turbine thrust bearing carrying 11,700 lbs. thrust. By successively removing the shoes, then by cutting back the babbit on two remaining shoes, the loading was increased to 9,800 lbs. per sq. inch. At this loading the bearing ran without overheating, but the extreme pressure spread the babbit out slightly.

Question: Is the Kingsbury bearing heating a metal-to-metal friction like the multi-collar horseshoe type?

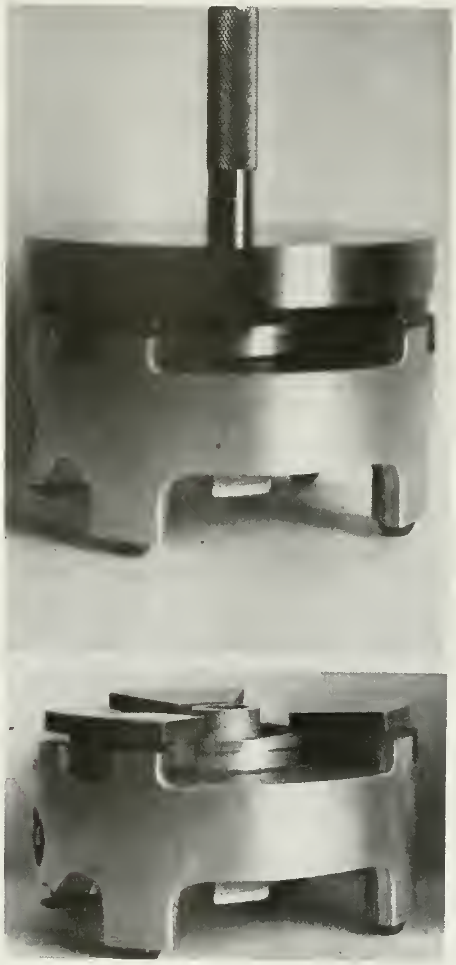


Fig. 4.

Answer: The unit pressure represents a hydraulic or fluid pressure. The surfaces are definitely separated from each other. The heating of the bearing, then, is fluid friction the same as would be obtained by raising the oil to the same pressure in pounds per sq. in. in a pump, then allowing it to escape into a vessel, wasting its energy in splash, impact churning and mixing within itself.

Question Is there any wear with the wedge oil film principle?

Answer: Being no metal-to-metal contact, there is no wear, or practically so. Any wear or polishing effect is due to starting and stopping when the first quarter revolution in starting and the last in stopping is without oil film, although the surfaces are wet with oil.

Question: How can we prove that there is no metal-to-metal-contact between the surfaces?

Answer: Figure 4 shows the assembled and disassembled view of a very interesting working model of the Kingsbury thrust bearing. It demonstrates the shoe on a rocking pivot, and the no metal-to-metal contact. A flashlight and battery are connected to pass current from the upper rotating member to the lower stationary member or shoes. When they touch metal-to-metal the light lights.

The most interesting thing about this little model is that it is lubricated with air alone. The shoes and collar are so true and polished that the air film of only .0001 inch is uniformly maintained, insulating the circuit, as indicated by the dark lamp. With the surfaces clean and dry a wedge-shaped film of air is drawn in, supporting the four pounds weight of the rotor as it spins. This little bearing, if oil lubricated, would easily carry over 1000 lbs. load, due to the vastly greater viscosity of oil over air.

Question: Is the wedge film principle important in other bearings?

Answer: The wedge-shaped film is vital in all liquid lubrication. With the journal type of bearing it is necessary to make the bearing larger than the journal by at least .0015" plus .001" for each inch of diameter, thus giving the so-called oil clearance. By displacing the journal to one side slightly, as shown in Fig. 5, the wedge-shaped film is obtained. This is done automatically as the liquid pressures in the film try to equalize.

Turbine thrust bearings and others have been made using the series of sectors each with its wedge-shaped oil film. It differs from the Kingsbury in that the sectors are not pivoted shoes, but are areas or surfaces carefully machined in babbit with a tapering clearance. This may be satisfactory where the viscosity is known and uniform.

Question: What is the spring thrust bearing?

Answer: Another type of thrust block is the spring thrust bearing. It, too, accomplishes the wedge-shaped film of oil, but in a different manner.

By making the babbited surface thin and backing it up with a thin steel plate it is semi-flexible. The plate, in turn, is backed up by many short, strong steel coil springs, placed just as close together as possible. The springs are preloaded uniformly so that the thin plate compresses them slightly when the local pressure exceeds the preloading. Thus the flexure of the plate allows it to form the wedge-shaped clearance.

Question: What losses in power are to be expected?

Answer: The losses in the wedge oil film type of bearing are all liquid friction, and roughly are one-tenth of the losses in the multi-collar horseshoe type.

The losses in the latter may be 50 horsepower or more, requiring water cooling of each thrust collar, while of the former the losses may be less than 5 horsepower for a ship of the same size and speed. Cooling can be taken care of by cooling the oil externally.

Our next article will discuss ball bearings and their care, as applied to marine auxiliaries.

HIGH SPEED ROTARY PUMPS

A Letter to the Chief

Sir:

I have been reading with interest, and with some edification, the article by you on "The Rotary Pump" in your March, 1939, issue. I must take exception, however, to a statement appearing on page 30 to the effect that, "For steam drive of auxiliaries, the small steam turbine spins too fast or must be geared to rotary pumps."

This is not true of the De Laval-IMO pump, which is shown in Fig. 4 of the article, as these pumps are often installed with directly connected turbine drive.

The speed at which any oil pump can be run depends to some extent upon the properties of the oil and its ability to withstand suction without vaporization, but, subject to this qualification, there is nothing in the design or construction of the De Laval-IMO pump which limits its speed, and the extremely large inlet areas permit of operation at conventional motor speeds and, under suitable conditions, at turbine speeds. As will be obvious to you, the moving parts are in perfect rotational balance. Small directly connected IMO pumps operate at 5800 r.p.m., and I believe some IMO pumps have been successfully operated at 10,000 r.p.m.

Quite likely in writing the statement concerning speeds which I have criticized, you had in mind other types of rotary pumps, for I notice that on page 29 you say, concerning Fig. 4, of the IMO pump, "In handling fluids with lubricating qualities, these pumps may be operated up to 500 lb. per square inch and very high speeds." However, IMO pumps working perfectly at pressures up to 200 atmospheres are in continuous use.

G. H. G.
New York.

Reader G. H. G.'s comments are well taken. Let other readers note corrections. "The Chief" welcomes criticism, particularly when as constructive and full of information as the above letter is.

"The Chief"

Engineers' Licenses

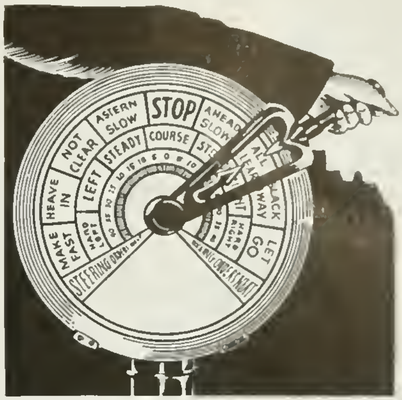
The following list shows licenses granted during the month of April to engineer officers of the merchant marine at Pacific Coast offices of the Bureau of Marine Inspection and Navigation:

Name and Grade	Class	Condition
PORTLAND		
Donald R. Bartosch, 3rd Asst. Eng.	OSS, any GT	O
Francis H. Williamson, 3rd Asst. Eng.	OSS, any GT	O
SEATTLE		
Merle A. Montgomery, Chief Eng.	OMS, any GT	O
Donald E. Rittenberg, Chief Eng.	OMS, any GT	O
SAN FRANCISCO		
Jean F. Cardinet, Chief Eng.	OSS, any GT	RG
Emanuel Hogh, Chief Eng.	OSS, any GT	RG
William V. Knight, 1st Asst. Eng.	OSS, any GT	RG
James A. Ready, 1st Asst. Eng.	OSS, any GT	RG
Olaf Gulliksen, 1st Asst. Eng.	OSS, any GT	RG
Donald R. McLeod, 1st Asst. Eng.	OSS, any GT	O
Albert W. Wulf, 2nd Asst. Eng.	OSS, any GT	RG
Herbert F. Kenyon, 2nd Asst. Eng.	OSS, any GT	RG
Daniel H. Kahlow, 2nd Asst. Eng.	OSS, any GT	RG
Fred W. Harmon, 2nd Asst. Eng.	OSS, any GT	O
Louis A. Appel, 2nd Asst. Eng.	OSS, any GT	O
Earl F. Groh, 2nd Asst. Eng.	OSS, any GT	O
George F. Sullaway, 2nd Asst. Eng.	OSS, any GT	O
Lee Aller, 3rd Asst. Eng.	OSS, any GT	O
William A. Shanelec, 3rd Asst. Eng.	OSS & OMS, any GT	O
Victor A. Hillman, Chief Eng.	OMS, any GT	RG
Joseph M. Gonzales, Chief Eng.	OMS, any GT	O

Abbreviations: GT is gross tonnage; RG is raised grade; O is original license; OSS is ocean steamer; OMS is ocean motorship.

Steady as you go!

KNOWLEDGE IS THE STRAIGHT COURSE TO ADVANCEMENT



A DEPARTMENT FOR DECK OFFICERS

AIR-BORNE DAMAGE TO SEA-BORNE CARGOES

VII. NEW METHODS of CARGO VENTILATION

By OLIVER D. COLVIN, WERNER H. E. HAHNE and MARK R. COLBY

From the preceding installments of this paper it will be evident that natural ventilation of cargo spaces as now practiced on the great majority of the world's seagoing freighters is unsatisfactory and in some cases positively harmful. Many attempts have been made to improve natural ventilation but these are limited in their scope for obvious reasons such as: the necessary blanking off and securing of all openings in very heavy weather; the dependence of cowls and vents on wind velocity and wind direction for their suction or pressure; and the condensation of moisture in cowls and cowl ducts.

These facts naturally lead to the consideration of mechanical aids to ventilation. In this field the conservor of marine cargoes finds an abundance of carefully designed, and very efficient, mechanical devices for the movement of large quantities of air and for the conditioning of that air in the factors of temperature and humidity. The authors of this paper propose that the conditioned air developed and moved by such devices shall be distributed under control in all cargo spaces through a system of permanent ducts built into the ship, supplemented in the case of special bulk cargoes by temporary ducts laid in the cargoes.

Evidently the arrangement of air ducts can be widely varied, and will also change somewhat with every cargo hold due to difference in construction, depth of hold, number of 'tween deck spaces, etc. Our studies and experiments indicate that an athwartship movement of the air is most desirable. With the air outlets and the return inlets arranged along the sides of the ship, part of the air will find its way through the cargo block and the other part will pass between the frames up over the cargo block between the beams, and down between the frames to the return ports. The amount of air passing through and passing over the cargo block will naturally vary to some extent with the nature of the cargo. Small-scale experiments indicate that with this duct arrangement about 50 per cent will pass through and 50 per cent over cargo consisting of a variety of boxes, bags and bales. This distribution would be quite satisfactory, as the air would take care of both the moisture and odors not only within the cargo block but also in the open air space where overhead deck condensation and free moisture leakage from the outside are likely to cause damage.

● The Two Duct Systems

Technical details as to how this arrangement should be executed

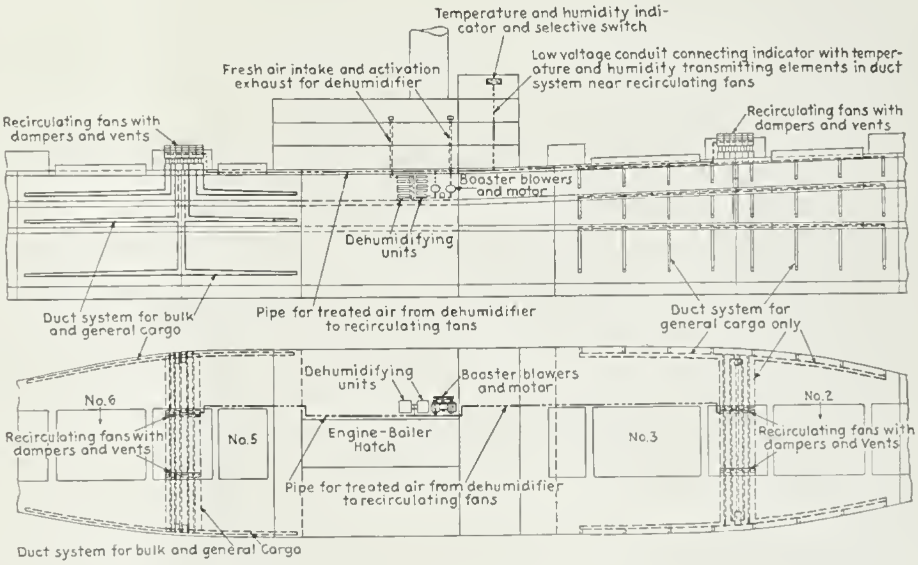

Temperature and humidity indicator and selective switch
Fresh air intake and activation exhaust for dehumidifier
Low voltage conduit connecting indicator with temperature and humidity transmitting elements in duct system near recirculating fans
Recirculating fans with dampers and vents
Recirculating fans with dampers and vents
Booster blowers and motor
Dehumidifying units
Duct system for bulk and general cargo
Pipe for treated air from dehumidifier to recirculating fans
Duct system for general cargo only
Dehumidifying units
Booster blowers and motor
No.6
No.5
Engine-Boiler Hatch
No.3
No.2
Recirculating fans with dampers and vents
Recirculating fans with dampers and Vents
Pipe for treated air from dehumidifier to recirculating fans
Duct system for bulk and general Cargo

Fig. 13—Inboard profile and plan of modern cargo vessel with new ventilating system for individual treatment of each hold and tween decks.

have resulted from elaborate discussions with ship operators. The deciding factors are space requirements, cost and weights. Out of the many different suggestions and ideas the following two stand out as best:

(1) Ducts for General Cargo and Bulk Commodities Such as Grain. Main air trunks are carried fore and aft along the inside of the frames at about 2 feet above the bottom of the hold. The duct is designed as shown in Fig. 14, and is a very simple duct adapted to quick installation. This duct permits spacing the air outlets (or inlets) very closely without additional cost. This duct has been developed with the thought in mind of aerating bulk grain cargoes, as well as general cargo. A number of small-scale experiments have been made with this type of duct which indicate that it could very well be used for this purpose without increasing materially the power required of the fan. The overhanging aprons on the sides will prevent bulk grain from covering the individual air ports; thus, the air can enter (or leave) the bulk grain over a comparatively large surface. It is not expected that all the air will take the horizontal route to the return ports. The lines of least resistance to the air flow in bulk grain are, in general, upwards and inboard from the outlets, then across the open air space in the hold and then downward, and outboard, to the intakes. This air flow would take care of the moisture overhead and especially along the sides of the ship, where cold water outside might cause the accumulation of a considerable amount of moisture as explained previously.

From the point of view of efficient aeration and simplicity of installation this duct system is believed to be very well adaptable to uninsulated cargo holds. The principal drawback is the exposed location of the ducts in the cargo hold. The space taken by the ducts will be small, and furthermore will be reduced by the thickness of the spar ceiling. But their exposed location makes them liable to damage during the handling of cargo, especially of long steel cargo, and by the habit of the longshoremen to hitch snatch-blocks to anything that seems handy for such a purpose. This matter is still under investigation and it is hoped that full-scale installations will soon develop valuable information along these lines.

(2) Ducts for General Cargo Only. The main air ducts in this design are carried underneath the deck beams next to the beam knees and made of a shallow rectangular form. Several branches from these main ducts are carried down the sides of the ship between the frames. In order to keep the cost of this arrangement low, these branches would be spaced about every 10 feet. They would terminate about 2 feet above the bottom of the hold.

The main ducts are out of the way of all ordinary cargo handling operations and can be made comparatively light. The individual branches are protected entirely by the frames and the sweat battens and can be still lighter. The resistance of this type of duct system to the air flow is slightly larger, all other conditions being equal, than that of the other system. Complete aeration of bulk grain cargoes will not be possible with this type of duct, but the aeration of general cargoes in boxes, bags and bales, should be equally good.

An Important Change in the Rules

As of April 24th a new rule applies to proof of citizenship for issuance of original licenses and renewal of licenses to deck and engineer officers, continuous discharge books and certificates of identification.

Applicants for the above licenses issued by the Bureau of Marine Inspection and Navigation claiming to be citizens of the United States shall produce to the Local Board of Inspectors evidence of such citizenship before taking an examination. Acceptable evidence is described below in the order of its desirability:

1. Birth Certificate or certified copy.
2. Baptismal Certificate or Parish record recorded within one year after birth.
3. Statement of a practicing physician certifying that he attended the birth and that he has a record in his possession showing date on which it occurred.
4. State Department Passport.
5. Seaman's Protection Certificate.
6. Report of the Census Bureau showing the **earliest record** of age or birth available. Request for such information should be addressed to the Director of Census, Washington, D. C. In making such request, definite information must be furnished the Census Bureau as to the place of residence when the first census was taken after the birth of the applicant, giving the name of the street and the number of the house, or the names of the cross streets between which the house was located if residing in a city; or the name of the town, township, precinct, magisterial district, militia district, beat or election district, if residing in the country; also the names of parents, or the names of other persons with whom residing on the dates specified.

   Note: A census was taken in the following years: June 1, 1860, 1870, 1880, and 1900; April 15, 1910; January 1, 1920; and April 1, 1930, (records for 1890 are not available).
7. Naturalized citizens must present Certificate of Naturalization or a certified copy of same.
8. **If none of the above-mentioned forms of evidence is available,** a statement to that effect should be made and correspondence in support of such a statement should be submitted.

The following may then be submitted for consideration:

School records, immigration records, insurance policies, affidavits of parents, or relatives, or an affidavit sworn to by two responsible citizens of the United States. (State circumstances of their knowledge of the applicant's citizenship.)

All officers applying for a renewal of their marine licenses must submit to the local inspectors proof of their citizenship.

Both of these duct systems lend themselves very well to a reversal of air flow. With the proper type of blowers and switches, the athwartship air flow may be reversed periodically. This method has been proved to improve materially the aeration of fresh fruit and similar cargoes by the elimination of "dead spots," with the result that the amount of air to be passed through the cargo may be kept at a reasonable figure.

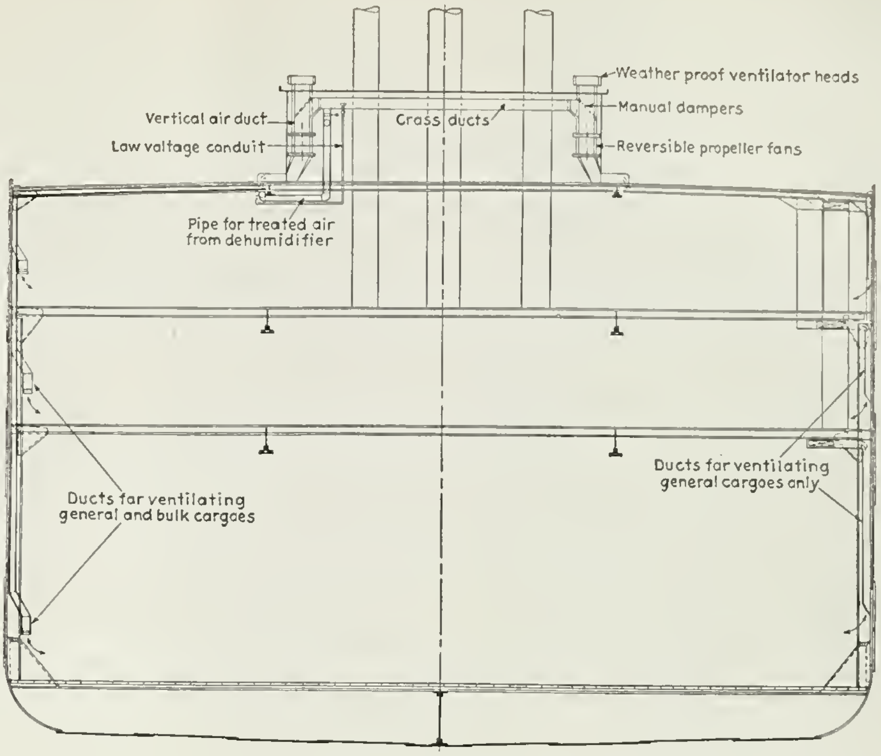

Weather proof ventilator heads
Vertical air duct
Cross ducts
Manual dampers
Low voltage conduit
Reversible propeller fans
Pipe for treated air from dehumidifier
Ducts for ventilating general cargoes only
Ducts for ventilating general and bulk cargoes

Fig. 14—Transverse section through typical cargo hold with ventilating system for individual treatment of each space.

• Control of the Air Condition

(1) Heating of Ventilating Air. All of the improvements discussed thus far have used principally the atmospheric air, as it is found in port or at sea. It has been shown that the temperature and dew point of this air are extremely variable from season to season, and from location to location.

We have emphasized that **the heating of humid air does not alter its dew point** or its moisture content in the slightest degree. It merely reduces its relative humidity, makes it more absorptive and thus "relatively drier." Therefore, if such heated air is blown into cargo holds in which there is cold metal cargo, the air will immediately cool off on contacting the cold cargo, returning it to its original condition or beyond. The chances are that the dew point of the air is higher than the temperature of the cargo, with the result that moisture will condense on the cold cargo, whether or not the air has been heated.

The only advantage in ventilating cold steel cargo with warm air is that the cargo will warm up faster. By the time the goods are unloaded in a tropical port, they should be warmer than the prevailing dew point in that district. However, condensation must not be permitted while warming up cargoes.

With respect to damp hygroscopic cargoes, preheating of the ventilating air is likewise of doubtful value.

The heat exchange through the hull of the ship being very much larger than that obtainable by ventilation, we venture to judge that the cargo could be heated artificially only, provided the outside is warm. In cold weather any heating of several thousand tons of cargo will be prohibitive. As an indication as to the amount of heat required for heating a cold cargo the following calculation may be of value:

The average specific heat of a mixed cargo can be assumed to be 0.5 B.t.u. per pound per degree F. In order to heat evenly a cargo of 1000 tons two degrees every day about 2,000,000 B.t.u's. are required theoretically. If this heat is to be gained from coal, we may assume an overall efficiency of about 10 per cent from coal to cargo by way of the boiler, heat transfer coils, ducts, etc. This would mean that we have to burn about 1600 pounds of coal daily for 1000 tons, or roughly 4 tons of coal per day for a cargo of 5000 short tons.

In order to transfer this heat by air to the cargo with a temperature drop in the air of 50 degrees, it takes roughly 80 tons of air per day or 1600 cubic feet of air per minute for every 1000 tons of cargo, equal roughly to two changes of air per hour. It should be noted that all of these calculations are approximate only. They should, however, give an idea of the scale of the quantities with which we are forced to deal in considering what goes on in a cargo hold.

The foregoing forces the conclusion that artificial heating of cargoes is not only impractical but more pointedly cannot be considered of assistance in preventing cargo damage.

(2) Cooling of Ventilating Air. With the advent of efficient and compact refrigerating equipment and the development of the air conditioning industry, it was tempting to try to use artificially cooled air in uninsulated cargo holds. Its use in insulated cargo spaces has been developed into a highly refined art.

There are a few special cargoes, such as hydrogenated oils and others, which have a melting point near 75 degrees. In order to maintain their quality, it is important that they do not become warmer than this temperature and melt. This was tried, therefore, on the United States intercoastal route. The air was cooled, and incidentally dehumidified, by refrigeration. The cool air was then distributed by means of slotted ducts through the hold and cargo. The experiment was deemed successful as the cargo could be kept below a temperature of 70 degrees on the entire voyage, probably with the exception of that portion which was closest to the warm hull of the ship.

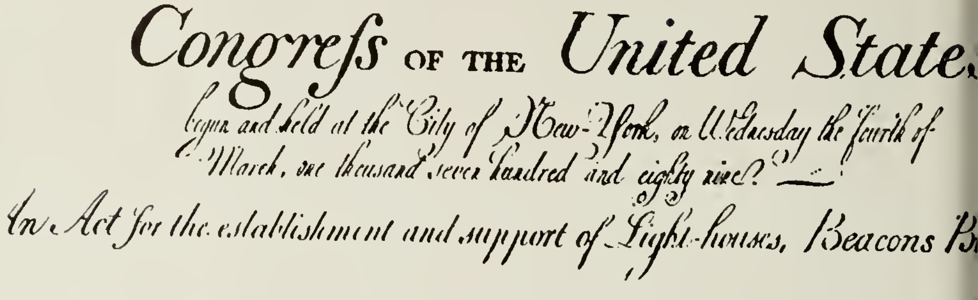
This is the only case we have heard of where artificial air cooling has been tried in uninsulated spaces. We venture the statement that there

(Page 52, please)

Looking down on Minot's Ledge

—U. S. Lighthouse Photo.

U.S. Lighthouse Service



Congreſs OF THE United State

begun and held at the City of New-York, on Wednesday the fourth of March, one thousand seven hundred and eighty nine.

An Act for the establishment and support of Light-houses, Beacons

The present year marks the 150th anniverary of the initiation of lighthouse activities under the Government of the United States, for on August 7, 1789, the first United States Congress, by the ninth act which it passed, provided that lighthouses, buoys, beacons, etc., which had previously been erected and maintained by the various colonies, be henceforth supported by the Federal Government. This act, by providing for the erection and maintenance of lighthouses and other aids to navigation, was the origin of the United States Lighthouse Service, and apparently was the first act of Congress providing for a definite Federal service which was not already specifically provided for in the Constitution.

The original act bears the signatures of Frederick Augustus Muhlenberg as Speaker of the House of Representatives; of John Adams, as Vice-President of the United States and President of the Senate, and of George Washington, as President of the United States.

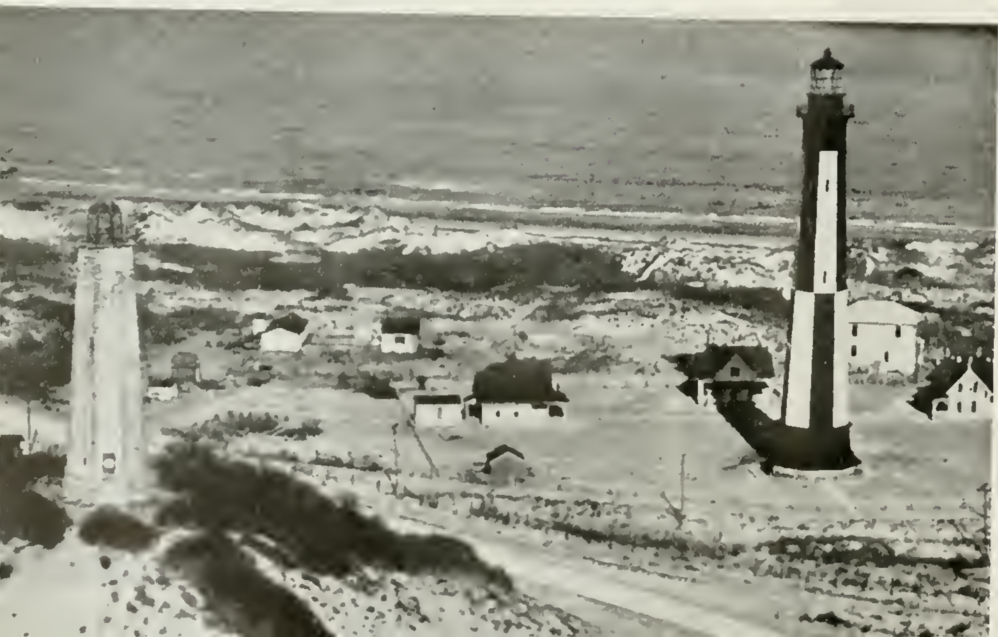
● Lighthouses in Use in 1789

At that time there were 12 lighthouses in operation, which had been erected by and were operated by the various Colonies. These lights and the years of their establishment, were as follows: Boston Light, Mass., 1716; Brant Point Light, Nantucket Harbor, Mass., 1746; Beavertail Light, entrance to Narragansett Bay, 1749; New London Harbor Light, Conn., 1760; Sandy Hook Light, New York Harbor, 1764; Cape Henlopen Light, Del., 1765; Charleston Light, S. C., 1767; Plymouth Light, on Gurnet Point, Mass., 1768; Portsmouth Harbor Light, N. H., 1771; Cape Ann Lights, Mass., 1771; Nantucket Light, on Great Point, Nantucket Island, Mass., 1784; and Newburyport Harbor Lights, Mass., 1788.

The building of four other lighthouses had been undertaken by the colonies, but they were not in operation at the organization of the Federal Government, these being Portland Head Light, Maine, 1791; Tybee Light, entrance to Savannah River, Ga., 1791; and Bald Head Light, at the entrance to Cape Fear River, N. C., 1796; and in addition to these, Virginia had projected the Cape Henry Lighthouse, but construction had not been commenced. Of these 16 colonial light stations, all are in operation at the present day, except Cape Henlopen, undermined by the sea and destroyed in 1926, and one of the twin lights at Newburyport, and one of the twin lights at Cape Ann.

Of the original lighthouse structures at these stations, only four remain, these being at Sandy Hook, Portland Head, Tybee, and Cape Henry. The original masonry tower built at Sandy Hook is still standing substantially as built; those at Portland Head and Tybee have been increased in height, and the original tower at Cape Henry is still standing but no longer lighted. The tower now in use at Boston was built in 1783, but has since been increased in height.

The act of August 7, 1789, provided for the erection of a light-



The original and the new lighthouse tower at Cape Henry, Virginia. Old tower was the first built under the U. S. Lighthouse Service.

—U. S. Lighthouse Photo.

house on Cape Henry, State of Virginia, at the entrance to Chesapeake Bay. Virginia had previously purchased and placed on the shore there some materials for a lighthouse and these had been buried by the shifting sands. They were now dug up and offered for sale to the Federal Government.

The administration of the lighthouse service was at the first directly under the Secretary of the Treasury, and so in March, 1791, Alexander Hamilton entered into an agreement with John McComb, Jr., of the State of New York, for the erection of a masonry tower. This document, the text of which is reproduced in another article, was the first contract ever entered into by the Federal Government for the erection of a lighthouse. There was also a curious supplementary contract with one Cornick to superintend the building of the lighthouse at a compensation of $2 a week. This Cornick was, apparently, one of the large family of that name residing in Princess Anne County, where the lighthouse was to be built.

Construction seems to have progressed at a satisfactory rate, for the light was first shown in 1792. The first keeper appears to have been Laban Goffigan who was serving in this capacity in 1794, and who 9 years previously had been a resident of Portsmouth, Va.

The tower, as actually built, was octagonal in plan, and constructed of sandstone, and so excellent was the workmanship, that it stands even today, no longer used for lighthouse purposes, but quite substantial in appearance despite the 147 years of its existence.

The lighthouse, in common with others of the same period, passed through various stages of lighthouse developments, the principal changes being in the kinds of oil burned in the lamps, and the introduction of the first lens just prior to the Civil War.

In the early days numerous matters were submitted to the President, and the early documents have been found frequently to bear the signatures and endorsements of George Washington, Alexander Hamilton, and others. On a document regarding the making of "a mooring chain for one of the floating beacons of the Delaware Bay," appears the endorsement, all in Washington's handwriting, "April 27th, 1793, Approved so far as it respects the new chain; but is there an entire loss of the old one? G^{o}. Washington." This and other existing documents demonstrate Washington's careful watch over the expenditure of Federal funds, and his personal attention to the details of government.

Personnel matters as well as those pertaining to construction and repair, also came under the eyes of the President for the early keepers of lighthouses were appointed by or with the approval of the Chief Executive. Washington, on more than one occasion, administered reprimands, enjoined closer attention to duty, and passed on the merits of applications for increases in salaries. Another early President who had a great influence on the personnel policies of the Lighthouse Service, was Thomas Jefferson. A document, with a notation from his pen, set forth the merit system, in the following language:

"I think the keeper of lighthouses should be dismissed for small degrees of remissness, because of the calamities which even these produce."

The Secretary of the Treasury was assisted in the lighthouse administration by the collectors of customs in the various ports. After some years this work was delegated to the Fifth Auditor of the Treasury, with the collectors of customs still acting as Superintendents of Lighthouses in their districts. In 1852 a Lighthouse Board was created by Congress and took over the entire Lighthouse establishment. Coasts and waterways were divided into districts each under an administrative and an engineering officer. The renowned scientist Joseph Henry was for many years chairman of this board and his leadership and influence effected great strides in the adoption of new illuminants, in the perfection of fog signals, and in new construction methods.

In 1910 Congress created the present Bureau of Lighthouses of the Department of Commerce to administer the United States Lighthouse Service, as a result of which important economies have been effected through simplification of organiza-

(Page 41, please)

Makapuu Point Light, Oahu, boasts the largest lens in the U. S. Lighthouse Service.

—U. S. Lighthouse Photo.

General view of Makapuu Point, showing lighthouse perched 642 feet above the Pacific, and its radio beacon towers.

—U. S. Lighthouse Photo.

A Modern FIREPROOF CANNERY STEAMER

The steamer William L. Thompson, commissioned by Columbia River Packers Association and Thompson Salmon Co., Astoria, Oregon, to carry fishermen and cannery workers to Bristol Bay, Alaska, is declared to be the most fire-proof passenger-carrying vessel flying the American flag.

Formerly the Pacific Spruce, the vessel was originally launched at South San Francisco in 1920 as the West Canon. She lay idle with three similar vessels at Lake Union, Seattle, for a number of years, until the United States Maritime Commission sold her last fall to Thompson Salmon Co. for $55,000.

The vessel had the following general characteristics:

Length B. P.	410.5 feet
Beam molded	54 feet
Depth molded	27.1 feet
Gross measurement	5509 tons
Net measurement	3426 tons
Horsepower	2200
Speed	9 knots

She was equipped with a triple expansion reciprocating steam engine directly connected to the propeller shafting.

W. C. Nickum & Sons, Seattle naval architects and marine engineers, were assigned by William L. Thompson, chairman of the board of directors of the Columbia River Packers Association and Thompson Salmon Co., to redesign the vessel for service carrying workers, supplies and equipment to the Thompson canneries at Nushagak and Nahnek.

The assignment meant installing in this ship the latest fire detection, fire prevention and fire fighting apparatus and equipment in accordance with the new and stringent regulations of the United States Bureau of Marine Inspection and Navigation.

The engine and steam generating plant were found to be in good condition after overhaul and no changes were made. All machinery was painted with aluminum paint and the engine room thoroughly cleaned and painted.

The cannery steamer William L. Thompson.

Nested lifeboats and lifeboat winch.

Albina Engine & Machine Works, Portland, received the contract to reconstruct the vessel and install the major portion of equipment, the contract price being $283,000. Afte all equipment had been installed, the vessel was declared to represent an investment of $425,000.

She contains quarters for 216 fishermen, 233 Oriental laborers, crew of 50 members, and 10 executives and foremen, total of 509 persons.

To provide proper quarters for the fishermen and crew, considerable rearrangement of the vessel's 'tween deck space was made necessary. The former house on poop was eliminated, leaving the after deck flush from the deck house admidships to the stern. The after well deck was enclosed with new steel top and sides, and new hatch tops erected for the No. 3 and No. 4 hatches. Rooms for four to six men each were constructed along both sides of the vessel in this new upper 'tween deck space.

All partitions were constructed of Johns-Manville Marinite, one of the first installations of this new product in any ship. Stainless steel strips and screws were used to fasten the Marinite in place.

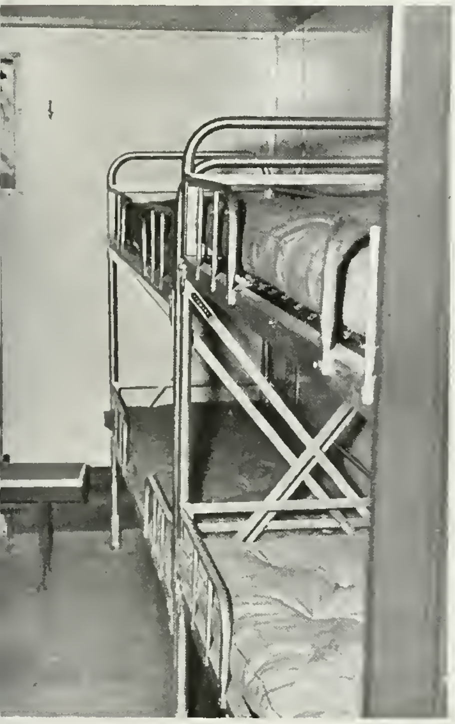
All steel decks in the crew and fishermen quarters are covered with a one-inch layer of Magnasite.

The upper 'tween deck spaces in No. 3 and No. 4 holds were converted into spacious recreation rooms for the fishermen, each space being about 35 feet by 25 feet in size. Steel hatch covers were constructed by the Albina company to give these spaces strong and smooth floors. These covers were filled with asbestos to reduce danger from heat in case of fire in the holds below. Steel tables and benches with linoleum tops were provided for card-playing and reading.

The No. 1 'tween deck was converted into a large dormitory with iron bunks in tiers of three each for the Oriental laborers. The 'tween deck hatch covers in this case were also made up of steel with asbestos enclosed inside, and tables and benches supplied for recreation purposes, as well as for dining.

A dining room 40 feet by 35 feet was provided directly under the main house and tables and benches capable of seating 108 persons at a time were installed in this room. These were manufactured by Northwest Copper and Sheet Metal Works, Portland. Walls and the ceiling of this room were lined with Marinite, and Modine copper-fin type steam radiators were built into the walls for heating purposes.

The adjoining galley is in fact a modern hotel kitchen, roomy and well-equipped. Two Lang ranges, each heated by DeLuxe Diesel oil burners, a Lang bake oven and a Cleveland steam cooker supplied by Green & Winkler, form the principal cooking equipment. All work table tops, drainboards, and storage shelves were constructed from stainless steel by the Northwest Copper & Sheet Metal Works.



Fishermen's room.

Fire detection, fire prevention and fire fighting, however, form the outstanding forward steps in this vessel.

The latest type of Richaudio smoke detection system and cabinet were installed. The cabinet is in the wheelhouse, and to it run tubes from 15 holds and storerooms. A suction system brings air samples from each hold and storeroom at frequent intervals. The presence of smoke in the cabinet causes an alarm bell to ring, attracting the attention of the officer on watch.

At the side of the cabinet is a push button with which the officer may instantly cut off the electromagnetic fire door release system causing four fire doors in the fishermen's quarters to close within a few seconds. These doors do not lock, but are held shut by pneumatic pressure. They may be opened easily by persons desiring to pass through.

Also in the pilot house is the Remler emergency loud speaker control and microphone, by means of which the captain or officer on watch may give orders throughout the ship. Ten loud speakers have been installed at key points on the deck and in the crew's quarters, and any or all of these may be operated at a time. Four microphones have been installed at stations on the deck where officers may talk back to the captain. (Captain P. J. Johnson, master of the William I. Thompson, declares that this is the first time he has had a berth where he has to listen to back talk.)

Beside the loud speaker control board are two telephones, one connected direct with the radio room, the other on a system which includes the engine room, steering engine room, steering wheel in the poop, and captain's private quarters directly below the pilot house. These installations were provided by the American Automatic Telephone Co.

Four 500-watt floodlights, furnished by Crouse-Hinds Co., have been installed on the captain's bridge and boat deck to light up both sides of the ship for night launchings of lifeboats.

Upper: Emergency loud speaker. Center: Telephones in pilot house. Lower: Magnetic release for fireproof doors.

In the engine room a Lux fire extinguishing system has been installed to protect the boiler room against fire. This consists of a set of CO^2 tanks installed in the upper portion of the room and a system of tubes leading to below the boilers.

The four fire doors may be closed not only from the pilothouse but also from push buttons installed beside each door, and by breaking of the glass in any of the 25 manual fire alarm boxes installed through the vessel. The electro-magnetic release system was furnished by

Cutler-Hammer Manufacturing Co.

All of the 96 doors in the ship are steel, manufactured in Portland by M. Reuter & Sons Metal Products Co.

Nearly 10 miles of electric wiring was installed in the vessel and all of it was encased in lead and armored cable manufactured by the National Electric Products Corporation, Ambridge, Pa. In places the cable rack in passageways contains as many as 35 cables. Electric installation was by Marine Electric Co., Portland.

The main generator is capable of supplying 50 KW for the vessel's normal needs, but an emergency 10 KW Kohler generator was installed in a small house on the boat deck. It was so arranged that when the voltage from the main unit drops, the emergency generator automatically starts. A complete emergency lighting system was installed to duplicate the main system.

The former wooden radio house on boat deck was replaced with a larger steel house lined with Marinite and containing a large radio room and a smaller room which serves as a bedroom for one radio operator. Quarters for two other radio operators are arranged below. Latest Mackay radio installation in the commodious radio room includes three transmitters, main, emergency and high frequency. A late model Mackay direction finder was installed on the pilot house.

Even the cold storage room has a coating of fire-proof insulation over the cork surfaces. A new cargo ice box containing 3500 cubic feet of storage space was installed in the No. 4 lower 'tween deck for the carrying of frozen meats to the canneries at Bristol Bay.

Steel furniture was provided throughout the ship, all of it manufactured by the Simmons Co. In the fishermen's quarters, the berths consist of tiers two high, while the Oriental laborers in No. 1 'tween decks are tiered three high. Equipment includes 518 mattresses, most of them cotton linters for the fishermen and laborers. Inner spring mattresses were supplied for officers.

Smoke detection cabinet.

Thirteen lifeboats were provided, eight of them being nested boats, each capable of carrying 45 persons, four of them being the original boats, each carrying 37 persons, and one a motor lifeboat for 20 persons and the Mackay emergency lifeboat radio equipment. The nested boats and motorboat were manufactured by Tregoning Boat Co., Seattle. A 90-horsepower Gray gasoline motor powers the motorboat.

Nine mechanical boat hoists of the latest type were supplied by H. R. L. Motor Co., Seattle. These may be operated by one man, who is enabled to lower a completely-filled lifeboat to the water without assistance. One of these hoists, while being tested, lifted a 16,000-pound load from the water to the ship's deck.

Ice water is piped throughout the ship and made available to crew and passengers at seven ice water fountains in the recreation rooms and crew's quarters.

The crew has its own quarters and mess room aft, hot food being brought back from the kitchen to steam tables provided there.

The Orientals, however, have their own kitchen and food preparation equipment in the forecastle. They also have their own toilet facilities, and will not be permitted to associate with the white fishermen at any time.

A feature of particular interest to cannerymen is the 30-ton boom installed over the No. 2 hatch where it can be used for lifting heavy machinery and fishing boats and barges from the hold to docks or water. One of the vessel's principal duties will be to transport cannery machinery and company boats to Bristol Bay.

Ten gas masks have been provided for fire fighting. Three each are located in the pilot house, engine room and on deck, while one is provided for the radio room.

The fishermen's washroom contains 16 bowls, each with an individual mirror, while the adjoining room contains weight-flush toilets. Four showers are provided, and an all-steel linen room is located nearby.

American Blower unit heaters are installed for heating the recreation rooms.

A Water System And a Bilge Pump

Two very interesting devices manufactured by the Geo. W. Fleming Co., Inc., of Plantsville, Conn., are on display at the showrooms of the Toumey Electric and Engineering Company, San Francisco, and are attracting a great deal of attention.

The first of these is the Fleming Electric Water System, which takes the place of the hand pump on sinks or wash basins aboard small craft. This system consists of an electric motor, a pump, and a push button faucet. On pressing the button the motor starts and the water runs. On releasing the button both motor and water stop running.

The system is self-contained, very simple, easily installed and very reliable.

The second device is Fleming's "Bilge Watch Dog," a very simple centrifugal pump electric motor combination that is furnished either with or without an automatic switch. This pump will deliver 300 gallons an hour.

All parts of each of these devices except the motor are made of high grade brass. Motors are supplied to suit the requirements of the user, for operation on 6, 12 or 32 volt batteries or for 110 volt A. C.

U. S. LIGHTHOUSE SERVICE

(Continued from Page 37)

tion, and the development of a career service under the merit system of civil service procedure.

Through the entire 150 years of the conduct of lighthouse work as a Federal function there can be traced a constant development and expansion concurrently with the territorial and commercial growth of the Nation.

Technical and engineering advancement in the Lighthouse Service have kept abreast of the development of the engineering arts and sciences. This technical progress has been paralleled by a constant improvement of administrative methods and progressive personnel procedure.

And likewise, through all these evolutionary developments can be traced noteworthy adherence to the examples of economy, discipline, decentralized organization and singleness of major purpose which were set up in the earliest years of the Republic. Reliability, service, and progress in the provision of safeguards for life and property at sea have thus become the purpose, the aim and the ideal of the U. S. Lighthouse Service.

Fire Extinguishing System on Most Fireproof Ship Afloat

The Panama R.R. Steamship Company recently-delivered liner Panama, designed by George G. Sharp and built by the Shipbuilding Division of the Bethlehem Steel Company, is acknowledged to be the most fireproof ship afloat. Nevertheless, she will always be carrying considerable quantities of combustible fuels, paint and items of general cargo. Therefore the owners and the designer equipped this vessel and her two sisters Ancon and Cristobal with the most modern and efficient fire detection and fire extinguishing apparatus available.

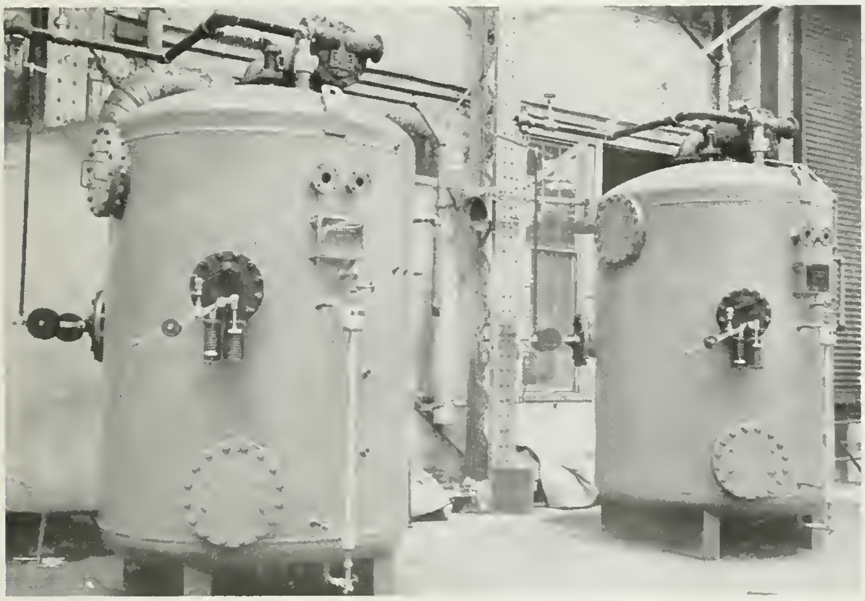
A combined Lux-Richaudio System, manufactured by Walter Kidde & Company, is installed for the protection of all cargo spaces, paint and lamp room, forepeak stores and boiler room.

The smoke detecting cabinet, located in the fire control station, is of the combined visual and audible type. Samples of air are drawn through a pipe from each cargo space to this detecting cabinet. An ingenious lighting arrangement permits these air samples to be illuminated so that finely divided smoke particles are easily detectible. In addition, this cabinet is arranged with an audible alarm so that the presence of smoke in any pipe causes a bell to ring both in the fire control station and in the engine room.

For fire extinguishing there are installed a total of seventy-five 50 pound capacity Lux cylinders so arranged that they can be discharged through the same pipe used for smoke detecting purposes. This is accomplished by the installation of a three way valve in each pipe line so arranged that the port to the detecting cabinet is closed before the port to the gas supply is opened.

A portion of the seventy-five cylinders is arranged to provide a bilge flooding system for the boiler room. In addition, there is a Lux 100 pound hose application unit in the boiler room and Lux 15 pound portable extinguishers in various locations throughout the ship.

Deaerating Feed Water Heaters



Cochrane deaerating feed water heaters for C-2 standard cargo vessels.

Our illustration shows two 53,000-lb. per hour Atomizing-Type marine deaerating feed water heaters designed by the Cochrane Corporation for the Maritime Commission's C-2 ships.

Tanks are of rolled plate welded construction designed for 30-lb. pressure. Operating pressure will average 10 to 15 lbs. per square inch.

The spring-loaded mechanism shown at front of the tank automatically controls the steam valve orifice to maintain constant pressure differential under varying steam flow.

Incoming feed water cools the vent condenser at top and then enters deaerating chamber to be deaerated and stored in base of tank.

The gage column and remote-indicating mechanism is shown at right of tank.

A float in storage tank shunts the feed water flow from vent condenser to distilled water tank through a spill-over valve when the water supply exceeds the demands of the boiler.

Robert F. Hand

The recently-appointed vice president of the Standard Oil Company of New Jersey, and general manager of its marine department, who is head of the greatest tanker fleet in the world.

Robert F. Hand

Appointed General Manager
World's Largest Tanker Fleet

At a meeting held April 20, 1939, the Board of Directors of the Standard Oil Company of New Jersey elected Robert F. Hand a vice president of the company and appointed him as general manager of the Marine Department, succeeding the late Robert L. Hague in both of these offices. Since 1935 Mr. Hand had been assistant general manager of the Marine Department. He thus becomes the chief of the greatest tanker fleet in the world.

Robert F. Hand is a native of Plainfield, N. J. On December 15, 1902, he joined the Foreign Shipping Department of the Standard Oil Company of New York as an office boy and clerk. He rose rapidly, and in 1908 was chosen as manager at Singapore of the Oriental Freight Department.

On January 1, 1912, he was appointed assistant manager of the Marine Department of the Standard Oil Company of New Jersey, and served very effectively in this position for fifteen years until the organization of the Standard Shipping Company in 1927, when Mr. Hand was made vice president and assistant general manager of the new company. This company absorbed the Marine Department of Standard Oil Company of New Jersey and other Standard Oil international shipping interests.

In 1935 the Standard Shipping Company was merged into the Standard Oil Company of New Jersey as an enlarged marine department of that firm, and Mr. Hand again became assistant general manager of this department.

Robert F. Hand, during this long career in connection with shipping, has been always a very keen student. He is a recognized authority on such subjects as maritime law and contracts, charters, marine safety, and marine insurance. The proceedings of many national maritime societies bear testimony to his ability for clear, forceful presentation of these subjects in technical papers.

Mr. Hand was appointed by President Hoover as a member of the American delegation attending the International Load Line Conference held in London in 1930, and was also appointed by President Coolidge as one of the experts on the American delegation attending the preliminary Conference on Oil Pollution of Navigable Waters held in Washington in 1926. He has been a tireless worker for the promotion of safety in the marine industry, and is vice president of the Marine Section of the National Safety Council. Mr. Hand is also a director of the American Merchant Marine Institute; an associate member of the Society of Naval Architects and Marine Engineers; former president of the Circumnavigators' Club; and in 1931 was honored by King Victor Emanuel III, who made him a Knight Commander of the Order of the Crown of Italy.

FIBERGLAS INSULATION ON NEW LINER PANAMA

Fiberglas insulation on the Panama Railroad Steamship Company's new liner, the Panama, now on her maiden voyage, comprises the largest use in the American Merchant Marine of this new non-organic insulating material, a recent product of the research laboratory, which is made of fine strands of pure glass.

This fiber glass material is employed as thermal insulation for the refrigerated cargo holds, with their 90,000 cubic feet of refrigerated space. Similar installations are being made on the Ancon and Cristobal, sister ships now under construction. In all, 960,000 board feet of Fiberglas will be used in the insulation of the three vessels, approximately 30 carloads, or 10 carloads for each ship.

Charles L. Day, in charge of the Marine Division of the Owens-Corning Fiberglas Corporation, explained that the particular qualities that adapt fiber glass for marine work are not only its low conductivity as an insulating material, but also its incombustibility, its light weight, its resistence to salt water and salt atmosphere, its ability to withstand vibration without settling, its non absorptive characteristics and its chemical stability.

The glass used in the manufacture of the marine insulation was selected by technicians of the Fiberglas Corporation for its particular adaptability for marine service. It is entirely glass, having no organic substances which would feed fungus growths, vermin or rot.

Something of the nature of the material may be seen from the fact that the average fiber is .0004 to .00042 inches in diameter, or twenty times finer than a human hair. The average length of all fibers is 1½ to 2 inches. This combination of fiber diameter and length produces a highly resilient insulation that resists settlements under extreme vibration, and consequently will not form gaps or uninsulated crevices. The density found upon study to be best suited for marine applications is 4 pounds per cubic foot, and that is what has been used on the Panama.

Glass, being waterproof and resistent to most chemicals, is ideally suited for ocean service, Mr. Day pointed out. Marine fiber glass insulation was subjected to a long test at Purdue University, where samples were immersed in 15 per cent, 25 per cent and in saturated solutions of brine for 308 days. No effect of the different degrees of solution could be detected, and at the end of the test the glass remained in good condition. Other tests made on aluminum and steel under conditions of high humidity and high temperature established that fiber glass contained no material which contributes to the corrosion of either metal. Still other tests established other particular properties of the installation which suited it especially for marine work. Tests at the University of Pennsylvania on fiber glass bats showed zero settlement after 72 hours of shaking in vibration machines designed to test the effectiveness of refrigeration insulation.

The insulation of the refrigerated cargo hold on the Panama is from 10 to 12 inches thick. Among the products handled in the service in which the ship will be employed are meats and tropical fruits.

Being a new material which was developed during the research of the depression years, fiber glass is just coming into important services. Its first marine use is on American ships. The fibers are fine and lustrous and resemble silk. They are formed into threads and may be woven into braids for electrical insulation, or into fabrics.

Marine uses for which the material already is adapted include thermal insulation ranging from the highest to the lowest temperatures and uses where imcombustibility is desired.

Literature of the Industry

Prevention of Scale in Marine Boilers, a 24-page booklet issued by Bull & Roberts, consulting chemists, New York City.

After showing that mechanical cleaning of boilers is expensive and that evaporators give uncertain protection, the booklet takes up boiler compounds and their evolution, including the U. S. Navy boiler compounds, and gives the chemical analyses of some twenty-five different commercial compounds which have been, or are being, offered for use in marine boilers.

The Hall System of water conditioning advocated in the present publication is based on the theory that those substances whose solubility in water increases with temperature precipitate as sludge when the concentration passes the saturation point, while, conversely, substances whose solubility decreases with temperature deposit as a hard scale. The former class includes carbonates and phosphates and scale can, therefore, be prevented by maintaining the concentration of carbonates or phosphates in such ratio to sulphates that the calcium will separate out as carbonate or phosphate sludge rather than deposit as hard sulphate scale.

Phosphates are preferred to carbonates for preventing scale since they are stable at high temperature. The Hall System maintains as the proper conditions for avoiding scale a phosphate to sulphate ratio in the boiler water high enough to prevent formation of hard scale, while at the same time holding the alkalinity high enough to prevent corrosion but low enough to avoid embrittlement or wet steaming. Metaphosphate has been selected as the most suitable treating chemical.

The rapid rise of the Hall System in the marine field is indicated by the fact that it is now applied on some 280 American ships sailing out of Atlantic, Gulf and Pacific Coast ports, including the 18-knot liner Panama, which recently entered service with boilers operating at 460 lb. gage, and is the first passenger ship built in this country since 1931. Copies of the booklet will be sent free to those interested.

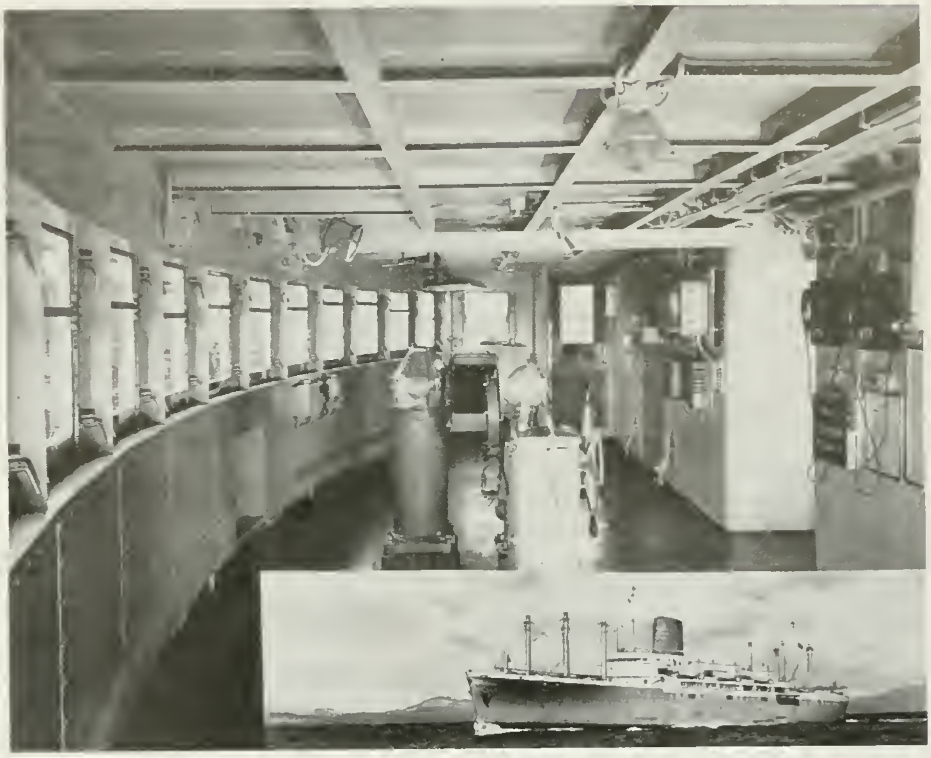
Window Installations on PANAMA RAILROAD LINERS

All special window installations on the three new cargo and passenger liners for the Panama R.R. S.S. Company were built by the Kearfott Engineering Company, Inc. The enclosed portion of the promenade deck is fitted with mechanically operated vertically sliding sashless window lights of ¾ inch thick special plate glass. The frames and the mechanism are of bronze and a bronze panel encloses the mechanism. The result is a neat, compact, all-metal window installation.

The private verandas in connection with the first class passenger bedrooms on this vessel are equipped with a window especially designed to afford maximum illumination and ventilation and also to be rugged enough to take the heaviest seas. These are bronze framed water tight windows with vertical sliding lights on the lower portion and fixed transom lights above. Heat treated plate glass ½ inch thick is used on the sliding portions and 1 inch thick plate glass on the fixed transoms. A sliding bronze guard plate controlled by mechanical gear protects the sliding light on its outboard side. In the lowered position this guard plate is out of sight.

Kearfott's most recent development is the Partable Lens Window, especially adapted for pilot house use. This window employs two sliding sashless lights operating in the same plane. For unobstructed vision these lights are adjusted with an inch wide vision slot between them and at a height to suit the eye level of the officer on watch. Frame construction of these windows is all in bronze, and "dogging" fixtures are installed for maintaining weather tightness at all positions of the lights.

Another interesting installation is the conventional type double sash window in the passenger and officers' bedrooms. As designed by Kearfott the flanges of the window frame form the finishing surface to the exterior plate of the deck house and to the bulkheading of the room's interior. Fitted in the frames of these windows are metal jalousies which slide out of sight when not in use.



Pilot house of S. S. Panama and insert of this steamer on her trial run.

The Kearfott Engineering Company Inc. specialize in the solution of difficult problems connected with the installation of windows on shipboard.

Naval Architects Win Naval Award

Last year the Navy Department asked for competitive designs of four types of small boats. The final winners were announced on March 29. The largest individual prize was $20,000, awarded in the name of S. A. Vincent, assistant naval architect of the Newport News Shipbuilding and Dry Dock Company.

Associated with Mr. Vincent were: Harry Monroe of the Hull Drawing room, who prepared the drawings; Mr. Stevens of the Hull Technical Section, who prepared the lines and hull calculations; Mr. Vincent prepared the correspondence, weights, hull calculations and hull specifications; and R. W. Nolan of the Engine Technical Section, who prepared the machinery and machinery arrangement and specifications.

S. A. Vincent, naval prize winner.

S. S. Taku Enters Alaska Service

By CHAS. F. A. MANN

The Alaska Transportation Company, newest Northwest steamship line, which had its beginnings in 1933 as a local company in Alaska, operating a single steamship between Southeastern Alaska ports and Puget Sound, began operating the newest addition to its fast-growing fleet of small freighters on May 19, when the Taku left Seattle for Sitka and Juneau.

Two years ago the Alaska Transportation Company was reorganized by a group of Alaska businessmen, and a trio of Tacoma industrialists, and a program launched to build up an organization that would give a regular weekly freight service to smaller Alaska ports and provide regular means of shipping concentrates down to the Tacoma smelter, particularly from the Taku River mining country, scene of a large new mining venture.

The Alaska Transportation Company is headed by S. A. Perkins, Tacoma, as chairman of the board; J. A. Talbot of Ketchikan, president; Henry Roden, Juneau, vice-president; Norton Clapp, Tacoma, vice-president; Henry Erwick of Ketchikan, secretary; Chauncey Griggs, Tacoma, assistant secretary. The executive committee consists of S. A. Perkins, Norton Clapp and Chauncey Griggs.

The Seattle office at Pier 7 is managed by Carl Strout, veteran Pacific Steamship Co. man, with Winston Jones as traffic manager.

Early this spring two ex-Moore & McCormack steamers, the Ormes and the Oratani, were purchased on the Gulf and brought to Seattle to be rebuilt and fitted out for the new service. W. C. Nickum Sons were assigned the job of supervising the outfitting work, and contract placed with Lake Union Drydock & Shipbuilding Co. for the drydocking work and installation of refrigeration space for carrying sizable frozen and iced fish cargoes.

The Taku (ex-Ormes) and her sister ship the Tyee (ex-Oratani), follow the same general plan of modernization. Contracts for modernization work on the Tyee will be awarded about May 25, with completion scheduled for the middle of July. The Taku and the Tyee have the following principal characteristics:

Length, B. P.	227 ft.
Beam	33.7 ft.
Depth	13.7 ft.
Tonnage (dw)	1921
Refrigerated cargo	450 tons
Refrigerated cargo space	18,500 cu. ft.

Machinery:
2 oil fired Scotch boilers.
1,400 H.P. triple expansion steam engine.

A third ship, the Tongass, is a 204 ft. wooden schooner, and with the new ships will provide a weekly service to some 25 small Alaska ports, not now given weekly calls by the larger liners. Alaska businessmen have worked hard for the establishment of this service, and with the backing lent by Tacoma men, a useful regular service for the new Alaska mining tonnage of copper and gold concentrates will be provided direct to the American Smelting & Refining plant at Tacoma, with ample small cargo and cargo coal traffic available for the Northbound haul.

Rebuilding work was speedily carried out at the Lake Union Drydock under the superivsion of Laurence Peabody, and Bill Nickum of W. C. Nickum Sons office. Work consisted principally of scraping the entire ship to bare steel and repainting, installation of 5 refrigerated cargo spaces, new ice machine, longer and heavier cargo booms and a small but beautifully appointed passenger lounge aft on the main deck.

Refrigerated cargo spaces have been fitted in the lower 'tween decks, and consist of: three smaller boxes in No. 1 hold, with a capacity of 800, 800 and 700 cubic feet respectively, which are used to carry fruit, milk, meat and vegetables on the

S. S. Taku leaving Lake Washington Canal on her maiden voyage.

Northbound haul; No. 2 refrigerated cargo hold, with a capacity of 7,500 cubic feet; and No. 3 hold, with 8,700 cubic feet. The two latter are used to haul fresh iced or frozen salmon and halibut on the Southbound haul.

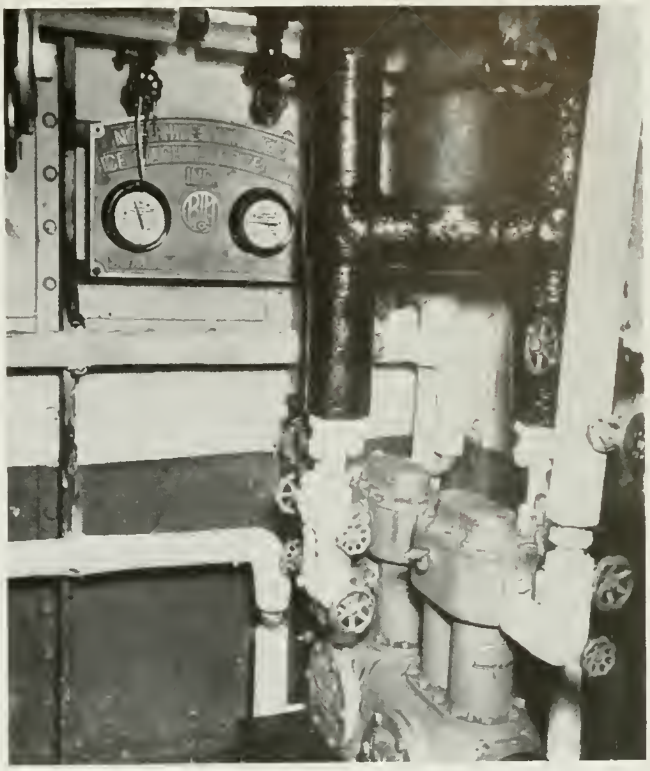
A steam driven Baker Ice Machine, having 4 cylinders, all of which are equipped with bypasses and speed regulator, provides ample capacity to hold all refrigerated spaces to zero if necessary.

The ship is divided into five watertight compartments by four transverse bulkheads and was originally constructed on Lloyd's 100 A-1 class. She carries 1,575 bbls. of fuel oil in the deep tanks and 526 bbls. of fuel in the deep tanks, or about 314 tons of bunker oil all told, sufficient to make the round trip to Alaska and back. Seven tons of fresh water are carried in the forepeak, 25 in the after peak, 60 near the engine room and 32 near the boiler room, or 140 tons of feedwater all told. Tank space for 10 tons of culinary water is also provided.

Refrigerated cargo space is all insulated with 6 inches of pressed cork, supplied and installed by Mac Dawson of the Seattle office of the Cork Insulation Co.

Crew's accommodation consists of 7 staterooms and 4 baths for a total of 32, including special deck personnel for use in Alaska, and the steward's department. The purser-radio operator, captain and chief engineer are all quartered forward on the upper deck. A de luxe stateroom for two passengers, equipped with separate bath, is located midships on the upper deck. The balance of the staterooms, dining saloon, galley, etc., are all located on the main deck. A luxurious little passenger and officers' lounge, done in blues and maroon upholstered furniture, designed by Mrs. Norton Clapp, is fitted aft on the upper deck. Only 12 passengers are carried.

As the Ormes, she was built at Todd's Tebo Basin plant, New York City, and all of her original machinery installation has been left without change, it being in excellent condition. Two 180 lb. pressure Scotch boilers, built by Standard Shipbuilding & Machinery Corp., are fitted, each with three furnaces and the Todd type oil burners and Howden forced draft. The auxiliary machinery includes: a Todd surface condenser with 1163 tubes, ¾ inch x 9 ft.; a battery of Worthington pumps; Hyde Windlasses; 2 new Lidgerwood winches; Warren fuel pumps; and Riley feed water heaters.



This Baker ice machine holds the five large capacity refrigerated cargo spaces at any desirable temperature.

The Tyee equipment will be practically identical to that of the Taku.

The Alaska Transportation Co. has adopted a novel stack emblem with the Taco in relief, the letter "T" being capatilized in both the company name and as the first letter on each ship name (Tongass, Tyee, Taku). All future ships of this line will adhere to the "T" nomenclature.

Elaborate welcoming celebrations were held at Ketchikan, Juneau, and Sitka for the first home-owned and operated Alaska steamer service the Territory has enjoyed since the turn of the century. Mr. Jones, traffic manager, assisted Mr. Talbot, president, with the welcoming celebrations, radio broadcasts and company "open house" celebrations at the three Alaska ports.

A small but beautifully appointed lounge takes care of the twelve first-class passengers.

Puget Sound Orient Line Begins Operations

After months of patient effort on the part of Seattle and Tacoma businessmen and shippers toward reestablishing the Puget Sound-Oriental steamship business, a strong operating company has been formed and contracts signed May 5 between it and the Maritime Commission.

The new line will be known as the Pacific Northwest Oriental Line, Inc., managing operator for a fleet of freight and passenger ships that will be supplied by the Commission. L. L. Bates, veteran freight traffic man with the Pacific Steamship Company, Admiral Oriental Line, American Mail Line, Dodwell & Co., will be general manager of the new company, with headquarters established at 805 Exchange Building, Seattle.

Since the refusal of the U. S. Maritime Commission to grant an adequate subsidy, the American Mail liners have been tied up, and the Northwest has been virtually without home-owned freight and passenger service to the Orient. Attempts were made to revive the American Mail Line and modernize the four President liners, now tied up in Tacoma and Seattle harbors. Failing in this, the next move was to get the Maritime Commission to assign the former Munson liners to the Puget Sound-Orient route. This attempt likewise failed and the Commission finally agreed to assign four Scantic liners, small freight and passenger ships, to a new operating company, provided one could be formed that would have the unanimous backing of the entire Puget Sound maritime interests and shippers.

The P N O Line was organized in April, and on May 5 word was received from W. Walter Williams, president of the Seattle Chamber of Commerce, that a contract had been successfully negotiated between the new company and the Commission.

Officers of the new line are as follows: president, Roscoe M. Drumheller, prominent Seattle financier; vice presidents, Joshua Green, Seattle shipping magnate and capitalist; Col. W. C. Bickford, port official; Fred H. Marvin of Tacoma, founder of the Merchants Transportation Company and Puget Sound Freight Lines; E. Rex Smith, secretary-treasurer. All are directors, in addition to W. Walter Williams, Wylie Hemphill, Pacific Coast Coal Co. executive.

For the Maritime Commission, Dudley B. Donald of Washington, D. C., acted in negotiations.

Operating offices and dockage has been established at Pier 41, Smith Cove terminals of the Port of Seattle, and Mr. Bates, the new general manager, will have his offices in the company headquarters in the Exchange Building.

Service to the Orient will begin June 15 with the sailing of the freighter Coldbrook, which came via Panama early in June. Service will cover all principal Oriental ports and Manila, Iloilo and Cebu. Three other vessels like the Coldbrook will afford a sailing every 3 weeks. Later in the summer four ex-Scantic liners, small but neatly appointed passenger-freighters, with accommodations for about 100 cabin passengers, will be placed on the run. In 1942 four fast motorships, now building at the Sun Shipbuilding & Drydock Co., will be assigned permanently to the Pacific Northwest Oriental Line, Inc. The pioneering work on reestablishing the service will be handled by the smaller freighters and the Scantic vessels to make way for the larger and faster motorships later on.

Selection of Loring L. Bates as general manager is a good omen, according to Seattle waterfronters. He landed his first job with Dodwell & Co. in Tacoma, Blue Funnel Line agents. In 1914 he was transferred to Seattle, and stayed with Dodwell until 1917. He then joined W. C. Dawson and the late H. F. Ostrander in a shipping venture to Alaska, and in 1918 went with Pacific Steamship Co., where he stayed until the company and its successors and subsidiaries folded up two years ago. He is a genius on freight rates and his 28 years' experience in the field stand him in good stead to make a success out of the new transpacific service.

Announcement was made by R. M. Drumheller, president of the Pacific Northwest Oriental Line, Inc., that the following appointments to key positions within the organization were made May 20: Capt. Erik G. Froberg, port captain; F. I. Rowe, assistant treasurer; H. T. Krull, district freight agent; E. C. Fritsche and A. J. Anderson, traffic department.

Puget Sound Orient Line will be the official trade name. The Coldbrook, Satartia, Collingsworth and Capillo, four sister ships of 8,000 tons each, will start the service June 15, and every 21 days thereafter.

New Small Snap-Action Limit Watch

Designed for use on machine tools, conveyors and other automatic equipment, a small snap-action limit switch recently announced by General Electric has the advantage of being so constructed that it can be easily mounted for operation in practically any position. The new device was developed to meet a need among machine designers and users for an inexpensive limit switch that not only would be small in size but which would also operate slowly without contact burning and be proof against oil and dirt around a machine.

This switch is enclosed in a sturdy die-cast case, drilled to facilitate mounting on either back or side. Silver-to-silver double-break contacts assure long life, while two independent circuits provide any contact arrangement. Positive snap-action is obtained by means of an over-center toggle mechanism. The switch can be supplied with either a roller-lever or push-rod head. A gasketed cover and grease seals on the push-rod and shaft make it oil-proof. Ample space inside the enclosure, as well as easily accessible terminals, permit rapid and simple installation.

DAMAGE FROM SILT AND SEA WATER ENDED

IN ANOTHER MATSON STERN TUBE

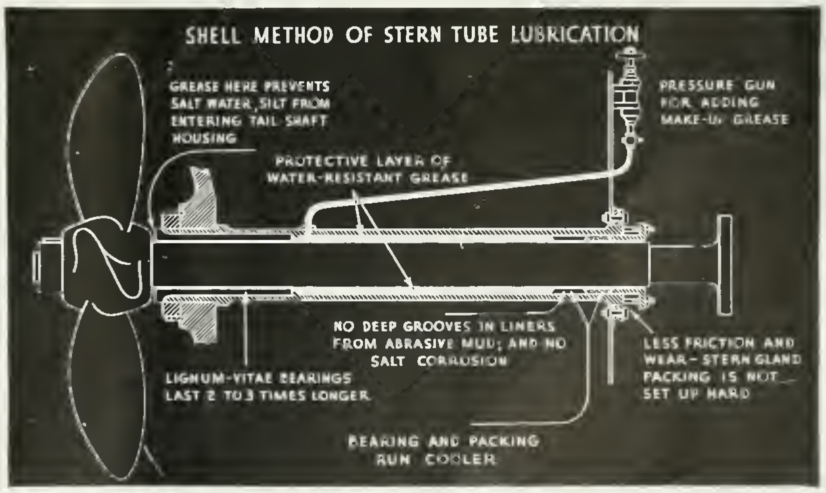
S. S. Maunawili is the fifth Matson vessel to install Shell's revolutionary new system of stern tube lubrication

Matson engineers saved their company thousands in overhaul and replacements by adopting Shell's stern tube lubrication method on the *S. S. Monterey*, *S. S. Mariposa*, *S. S. Lurline* and *S. S. Matsonia*.

Now they are extending it to the Matson freight fleet! The first installation is in the crack cargo vessel, *S. S. Maunawili*.

This revolutionary Shell method feeds a protective coating of water-resistant grease to the stern tube assembly. It ends the former damage from silt and salt water. Tail shafts when drawn are found to be exceptionally smooth. There are no longer deep grooves and pits in the liners. Bearings show very little wear. Gland packing trouble is overcome. And there is no water leakage to the after well.

A Shell marine engineer will give you full details about this new method of stern tube lubrication. Ask him, too, about Shell's new improved system of lubricating underwater valves (also recently adopted on the *S. S. Maunawili*). Phone nearest Shell office. Or write to Industrial Lubricants Division, Shell Oil Co., Incorporated, San Francisco.


SHELL METHOD OF STERN TUBE LUBRICATION
GREASE HERE PREVENTS SALT WATER, SILT FROM ENTERING TAIL SHAFT HOUSING
PRESSURE GUN FOR ADDING MAKE-UP GREASE
PROTECTIVE LAYER OF WATER-RESISTANT GREASE
NO DEEP GROOVES IN LINERS FROM ABRASIVE MUD; AND NO SALT CORROSION
LIGNUM-VITAE BEARINGS LAST 2 TO 3 TIMES LONGER
LESS FRICTION AND WEAR – STERN GLAND PACKING IS NOT SET UP HARD
BEARING AND PACKING RUN COOLER

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SHELL MARINE MARICA OIL — For reciprocating engines
SHELL MARINE ARCTICA OIL—For ice machine lubrication
SHELL MARINE JANUS OIL— For turbine lubrication
SHELL MARINE TELEMOTOR OIL
GOLDEN SHELL MARINE MOTOR OIL

On the Ways - SHIPS IN THE MAKING

LATEST NEWS FROM AMERICAN SHIPYARDS

Another New Tanker for Union Oil Company

The most important new shipbuilding contract in the United States for the month of May was an order from a Pacific Coast owner to an Atlantic Coast shipyard.

On May 17 the Union Oil Company of California signed an order to the Shipbuilding Division of the Bethlehem Steel Company for an exact duplicate of the tanker L. P. St. Clair. This is the second tanker order from Union to Bethlehem and is another step in a carefully planned replacement program for the modernization of the entire Union fleet. Readers will remember that the tanker L. P. St. Clair was delivered on February 28, 1939, and arrived on the Pacific Coast on March 24. (Complete description published in April Pacific Marine Review.)

The new tanker will have the following characteristics:

Length overall	463' 0"
Length B. P.	442' 0"
Beam molded	64' 0"
Gross measurement	8066 tons
Net measurement	4814 tons
Cargo capacity 98 per cent full	101,400 bbls.
Fuel capacity 98 per cent full	10,500 bbls
H. P. Normal	3,500
Speed loaded	13 knots
Cruising radius	20,000 miles
Loaded draft	28' 4"
Displacement (loaded)	16,970 tons

TWIN LAUNCHING AT FEDERAL

At Kearny, N. J., on May 20 two Maritime Commission C-2 standard steam drive cargo vessels were launched from adjacent ways with an interval of twenty minutes between launchings. Both were named after famous American clipper ships, the sponsor in each case being the wife of a Maritime Commissioner.

First off the ways was the Challenge, christened by Mrs. Thomas M. Woodward and named after the beautiful clipper designed and built by William H. Webb of New York City, perhaps the most capable, and certainly the most public-spirited, of America's great shipbuilders. Webb not only built many fine clippers, but was the first to see that the commercial job of the sailing ship called for fuller lines and a little less emphasis on speed. He built many of the best modified clippers and packets and many of our early ocean-going steamers. His will left his New York property and much of his fortune for the establishment of Webb Institute.

The original Challenge was built in 1851, had a builders' measurement tonnage of 2006, was 234 feet long, about 7400 tons; and sea speed 15.5 knots.

43 feet 7 inches beam, and had a hold depth of 25 feet 8 inches. She had a fine turn for speed under "good conditions," often logging 16 knots. On one voyage from Hongkong to San Francisco she averaged 10 knots. She was, however, a very unlucky ship, and seldom met "good conditions." One record her namesake will find hard to beat. The sailing ship Challenge cost $120,000. Her freight list, San Francisco to New York, on first voyage was over $60,000, besides passengers. She paid for herself in the first round voyage. Challenge was sold to British registry in 1862.

The second launching was that of the Red Jacket, christened by Mrs. Edward C. Moran, Jr., and also named after the famous clipper built in 1853 at the yard of George Thomas, Rockland, Maine, after designs by Samuel A. Pook of Boston. This ship on her maiden voyage established a sailing record from New York to Liverpool of 13 days, 1 hour, 25 minutes elapsed time from dock to dock. On this voyage she frequently logged 18 knots. She made a record round trip (5 months, 10 days, 22½ hours) between Liverpool and Melbourne, under charter to the British White Star Line but flying the American flag. She was then sold British in 1855.

Her dimensions were: length 251 feet, 2 inches; beam 44 feet; depth of hold 31 feet; draft 22 feet; gross measurement 2305 tons.

The new S.S. Challenge and S.S. Red Jacket have dimensions as follows; length overall 459 feet; length between perpendiculars 435 feet; beam molded 63 feet; depth molded 40 feet, 6 inches; draft loaded 25 feet, 9 inches; gross measurement

SHIPBUILDERS and ENGINEERS

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capacity
FOOT OF SCHILLER STREET
Tel.: ALameda 0533

GENERAL ENGINEERING and DRY DOCK COMPANY

Sparrows Point Launches Tanker

At noon on April 29 the Mobilube, latest addition to the fleet of Socony-Vacuum Oil Company, Inc., New York, slid down the ways at the Sparrows Point, Md., Yard of Bethlehem Steel Company. Mrs. Charles E. Arnott, wife of a vice-president and director of Socony-Vacuum, was the sponsor.

This is the second Socony-Vacuum tanker built by Bethlehem Shipbuilding Division during the past year. A sister ship, the Mobilfuel, was launched on February 25 and will be ready for delivery in the immediate future.

The Mobilube has a deadweight of 16,100 tons and a tank capacity of 133,000 barrels, or 5,586,000 gallons of oil. The cargo tank space is divided into 24 compartments, allowing many grades of oil to be carried at one time. Pumping capacity is designed to load or unload the vessel in 16 hours.

The principal dimensions of the new tanker are as follows:

Length, overall	501' 7"
Breadth, molded	68'
Depth, molded	37'
Draft, loaded	29' 8½"
Speed	13 knots

The Mobilube is built to the highest class of American Bureau and Lloyd's Register of Shipping under their special survey, and in accordance with the latest regulations of the Bureau of Marine Inspection and Navigation for vessels carrying petroleum products in bulk. She will be used principally for coastwise service, and meets all the requirements for the Panama and Suez Canals.

Lloyd's Register of American Yachts

Founded in 1903, the new edition of Lloyd's Register of American Yachts is a measure of the development of yachting over a period of 37 years; the initial volume, with a total of 450 pages, 1939 yachts, 91 club burgees and 1078 private signals of yachtsmen, having grown to a total of 754 pages, 6862 yachts, 739 clubs and associations, and 2932 private signals.

The new yachts of 1939 show clearly the present tendencies of American yachting, and offer much food for study by those responsible for the development of the sport.

There are no additions to the regular racing classes under the Universal Rule; the only racing yacht added to the fleet being the 12-metre "Vim," designed by Sparkman & Stephens for Harold S. Vanderbilt. This yacht has been shipped abroad to race in England this summer, and her performance with the British 12-metre class will be followed with keen interest.

Another yacht from the same yard, namely, Henry B. Nevins, City Island, New York, is the auxiliary keel cutter "Polly," designed by Mr. Nevins and his associates for his own use. These two yachts probably mark the highest standard of construction yet obtained in the art and science of yacht building.

CARE OF CARGO AT SEA

(Continued from Page 35)

will be little future demand for such type of ventilation, applicable only to special, extraordinary commodities. Cargoes sensitive to high temperatures will either be carried in cool lower holds away from hot metal and machinery, or, if this should not be sufficient, they will be carried in refrigerated spaces which are readily available in all trades.

A general word regarding the cooling and heating of the ventilating air may be said. We have seen that most of the cargoes carried in uninsulated cargo spaces may be heated or cooled within the variations of the sea water and atmosphere without damage as long as condensation and other moisture damage is prevented. Furthermore, the moisture transfer of hygroscopic goods is smallest or completely stopped when the goods have the same temperature as the air. In most instances it is best for the cargo, if it has the same temperature as the outside atmosphere and sea water. Therefore, **the aim of a good ventilating system should be to keep the temperature of the cargo close to the temperature of the outside atmosphere and sea water.** Normally the difference between sea water and atmospheric temperature is nominal and there should be no great difficulty in striving for this result. At times, when both those temperatures materially differ, a compromise temperature will be selected.

The equalization of cargo temperature and outside temperature is going on naturally, all the time by way of the ship's hull and structure. The heat transfer obtained this way is generally too slow to prevent major temperature differences, and must therefore be assisted artificially. The previous discussion indicates that the artificial cooling or heating of the air is not feasible for the uninsulated cargo compartments of a ship. The only possible method will be to increase the natural heat transfer through the hull and ship's structure by more rapid air circulation. The more rapid the air is passed from the hull through the cargo, and reverse, the quicker the heat exchange will be. We have indicated the possible limit of such method but it is believed that much can be gained by using proper mechanical ventilation in combination with well designed air distribution.

We have seen that even a powerful circulation of air cannot at times prevent the temperature of the cargo from falling considerably behind the temperature and dew point of the atmosphere. No ventilation system of practical dimensions will be able to heat up a large cargo some 30 degrees within 8 hours, a change which may occur in winter time on the United States intercoastal route near Hatteras going south. On special ocean routes where extreme temperature changes do not occur, such as the North Atlantic route, a mechanical ventilation system of sufficent size may possibly prevent a harmful temperature difference between cargo and atmosphere. On many other ocean routes harmful temperature changes occur, especially in the winter season. Therefore, during periods of rapid and substantial rises of the atmospheric dew point, the cargo holds must not be ventilated with fresh air. In order to continue the necessary heat exchange between cargo and the outside, the air must be recirculated in the cargo hold during that time. By recirculating the air in the hold it is alternately brought in contact with the metal of the ship and with the cargo, and a rapid heat exchange is obtained. This recirculation has another purpose; it prevents the local accumulation of foul air and of moisture. Any moisture and odors that develop in the closed hold during this period must be removed, lest condensation and tainting damage occur.

Our studies and experiments lead us to the following method, which has several great advantages:

(1) Aeration and dehumidification are entirely separate functions.

(2) The moisture content of the

Deck Officers' Licenses

The following list shows licenses granted during the month of April to deck officers of the merchant marine at Pacific Coast offices of the Bureau of Marine Inspection and Navigation:

Name and Grade	Class	Condition
SAN PEDRO		
Clyde O. Hicks, Master	OSS, any GT	RG
Fritz A. Weise, Master and Pilot	CWSS, 3500 GT	O
Leonard Olsen, 2nd Mate	OSS, any GT	RG
PORTLAND		
John H. Drysdale, Chief Mate	CWSS, any GT	RG
SEATTLE		
Robert A. Vassar, 3rd Mate	OSS, any GT	O
SAN FRANCISCO		
John Galbraith, Master	OSS, any GT	RG
Earl F. Manning Master	OSS, any GT	RG
Wilhelm Schutt, Master	OSS, any GT	RG
Charles E. Frisius, 2nd Mate	OSS, any GT	RG
Julius A. Zinn, III, 2nd Mate	OSS, any GT	RG
Clennon A. Kemp, 2nd Mate	OSS, any GT	RG
Alfred V. Lancaster, 2nd Mate	OSS, any GT	O
Glenn J. Shannon, 2nd Mate	OSS, any GT	O
James H. Kennefick, 3rd Mate	OSS, any GT	O
John O. Heino, 1st Class Pilot	OSS, any GT	O

Abbreviations: GT is gross tonnage; RG is raised grade; O is original license; OSS is ocean steamer; OMS is ocean motorship.

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air in the hold is controlled and simultaneously foul air is expelled.

(3) The dehumidifier can be located centrally without impairing the watertight integrity.

(4) The moisture load of the unit itself is independent of the amount of moisture evaporating from the cargo. This is a great advantage in cool weather, with warm damp cargo in the hold.

The air to be treated is taken from the atmosphere. The intake to this small vent must be so located as to be unaffected by bad weather and should be as close to the drying unit as possible. A convenient location near the skylight or on the boat deck can easily be found. This air is dried in the dehumidifying unit. The treated air is then conveyed by a standard pipe through the shelter deck to the cargo holds. In the cargo holds the treated air is thoroughly mixed with the air already present in the hold, thus reducing the dew point of the air in the hold. A certain stream of treated air is forced into the cargo hold, displacing the same volume of air from the cargo space. The air which is displaced from the cargo hold finds its way out through a small vent properly located. This foul air escaping from the hold takes with it the moisture that is evaporating from the cargo. At the same time this air carries odors, gases and fumes, which are thus removed from the cargo space, which is practically sealed.

Formula for Moisture Removal

The removal of moisture by the above method from an empty cargo space filled with humid air can be followed by the formula:

$$m_2 = e^{-at}(m_1 - m_3) + m_3$$

where m_1 = the moisture content of the cargo hold at the beginning of the treatment;
m_2 = the moisture content of the hold, which is desired after the time t;
m_3 = the moisture content of the treated air:
t = the time of the treatment in minutes;
e = 2.718, the base of the natural logarithms;
a = the rate of treated air supply in cubic feet per minute per cubic foot of cargo space.

This formula is found by simple integration. It indicates that about 100 cubic feet of treated air per minute will be required for a full cargo space of 100,000 cubic feet capacity, in order to reduce the dew point in this space from 80 degrees F. to 50 degrees within 12 hours. The permeability of the full cargo space is assumed to be 60 per cent. The cargo is assumed to release no moisture, and the moisture content of the treated air m_3 = 10 grains per pound.

The rate of evaporation of moisture from different cargoes is difficult to find. We were able to obtain one figure from a cargo of Argentine corn, weighing about 6000 tons, that had lost 60 tons of weight. This was proved to be moisture loss. Based on the length of the voyage, we calculated that there was an average daily rate of evaporation of about 500 pounds per 1000 tons of grain on this particular voyage.

The most extreme example of evaporation given us concerned a cargo of boiled rice, which lost as much as 1.23 per cent of its weight in a 6-day voyage. This amounts to an average rate of evaporation of 4100 pounds per day per 1000 tons of rice.

Other approximate data have been obtained on shipments of green lumber from the Pacific Northwest to the Continent, which indicate that the average maximum evaporation load per day is between 200 and 500 pounds of moisture per 1000 tons of damp hygroscopic cargo.

It will be noted that this 500 pounds of evaporated moisture is a much heavier load than would come from only the air in the hold. Calculations indicate that mechanical ventilation will reduce the peak moisture loads during periods of temperature changes. Therefore, we believe that a load of 250 pounds per day of evaporated moisture for every 1000 tons of cargo should be a fair maximum load.

These 250 pounds per 1000 tons have to be carried away by the displaced air. For the purpose of calculation this load is assumed to be constant, for lack of better information, and is added to the final moisture content m_2 after dividing 250 pounds by the amount of treated air per day.

Several other factors are in our favor and our calculations indicate that 500 cubic feet per minute of substantially dry air for every 100,000 cubic feet of cargo space will be ample for controlling the moisture in the holds. Certain deductions are made for spaces, which are exclusively used for wet stowage and for deep tanks. The total amount of

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treated air needed for an entire ship will be between 1200 and 2000 cubic feet per minute. This capacity is derived from the premises that the cargo will evaporate 250 pounds per 1000 tons in 24 hours, and that the moisture load from the atmosphere will come from a 30-degree drop in dew point within 12 hours. This is generous capacity.

(e) Methods of Dehumidification. There are two methods of dehumidification available today: (1) By refrigeration, and (2) by absorption.

The method by absorption has become of great industrial importance in recent years. For marine use it has certain basic advantages.

Refrigeration has no advantages which are not fully balanced by somewhat similar advantages of the absorption system. On the contrary, dehumidification by use of a good regenerative absorbent such as silica gel, has many advantages which make it the most practical by far, not only in the technique of drying the cargo spaces, but also from practical shipbuilders' economics. Among the latter are lower weight, less cost, less than one-half the power requirements, no moving parts but blowers, no brine system or ammonia condenser, self-contained, less maintenance and less chance of disablement. When all the advantages are listed, the choice is obvious.

Among the chemicals that have suitable mechanical properties, silica gel is by far the most efficient. Under favorable conditions it can absorb as much as 40 per cent of its own weight and under unfavorable conditions, such as occur during ocean voyages in humid tropical weather with warm cooling water, it will absorb about 15 to 20 per cent of its own weight in moisture. With properly designed equipment there is no difficulty in reducing the moisture content of the treated air almost to zero. Silica gel has been used highly successfully in a great many large and small industrial installations and we have found it to be undoubtedly the most practical material for use on board ship.

From interviews with many ship operators, it seems to be the majority opinion that the dehumidifying units and their control valves should preferably be controlled manually, and not automatically. A change in cycle, requiring about two minutes, for turning a few valves, is made every hour. This would probably be a duty of an engineer on watch, making his regular entries for the engine room log.

Change of Masters

Steamer: Montanan: O. L. Thomson; vice, E. H. Phillips
Steamer Manoa: F. I. Hamma; vice, S. E. King
Steamer Point Arena: L. Hunter, vice, E. H. Phillips
Steamer West Ivis: James R. Granman; vice, N. A. Nielsen
Motorship Chilkat: Martin Boers; vice, T. P. Collon
Steamer Captain A. F. Lucas: C. B. Petterson; vice, J. S. Christenson
Steamer Silverado: N. A. Nielsen; vice, C. F. Wifstrom
Steamer West Shipper: K. K. Maden; vice, E. Mesak
Steamer Waimea: J. H. Cunningham; vice, A. Skjellerup
Steamer Mexican: Bertol Leep; vice, C. H. Brunn
Motorship Hawaiian Standard: A. E. Koskin; vice, L. J. Williams
Steamer Alabaman: E. J. Anderson; vice, F. H. Roberts
Steamer West Ivis: James R. Granman; vice, A. J. Westerberg
Steamer West Cape: J. H. Granman; vice, B. Kuckens
Steamer Ohioan: F. E. Roberts; vice, K. Hansen
Steamer Mapele: O. Bergman; vice, F. E. Trask
Steamer Point Clear: G. T. Nielsen; vice, E .H. Phillips
Steamer Walter A. Luckenbach: Ralph McKinnon; vice, L. S. Jellison
Steamer Illinoin: Peter Sungas; vice, F. H. Bain
Steamer Redwood: L. E. Madsen; vice, Max Blisath
Steamer President Coolidge: H. O. Kohlmeister
Steamer Illinoin: F. H. Bain, vice, P. Sungas
Steamer Kanak: T. P. Callon; vice, W. W. Williamson
Steamer Mauna Ala: C. W. Saunders, Jr.; vice, T. A. Cunningham

Observations From The Crow's Nest

"NAMES AND NEWS" ★ BY BERNARD De ROCHIE

Union Oil Executive Retires

William Groundwater, former manager of marine transportation for Union Oil Company of California, recently announced his retirement from the company to devote his time to private business interests in Southern California. For the past 28 years Mr. Groundwater has been an active member of the organization and has held many responsible positions during that time. Since announcing his retirement he has entered into partnership with A. C. Cable, former operating manager for Hammond Lumber Company, whose wide experience in that field extends over more than 30 years. Known as the Alert Lumber and Mill Company, with headquarters located at Bell, California, the new concern will retail lumber and building construction materials, engaging also in general contracting work and developing real estate interests.

Beginning his association with Union Oil Company on January 6, 1911, Mr. Groundwater in the course of a few years established himself as an able executive. Starting out as an engineer in various pumping plants, he soon was placed in charge of the mechanical equipment and personnel on the producers pipe line, and in 1913 the Lompoc line was added to his responsibilities. After a series of promotions he was elevated to the position of manager, which was followed by his appointment as Director of Transportation. Both positions involved the maintenance and direction of the company's tanker fleet, pipe line systems, and tank trucks.

WM. GROUNDWATER

His active participation in transportation affairs brought him in contact with many of the leading figures in the industry, especially in pipe line and marine circles. A native Scot, Mr. Groundwater is generously endowed with the characteristic good humor of his race, and through his keen judgment and affability he won recognition in the form of appointments to many local and national marine and pipe line committees. He was a director of the Pacific American Steamship Association, and the Los Angeles Steamship Association, a member of the Marine Service Bureau, Lloyd's Register of Shipping, the American Society of Mechanical Engineers. He is also a past chairman of the Pacific Coast Marine Section of the American Petroleum Institute, and a past president of the Pacific American Tankship Association. In 1936 he was appointed a director of the Los Angeles Chamber of Commerce and chairman of its Harbor, Foreign Commerce and Shipping Committee, after having served on this committee for 10 years.

John D. Reilly Gift

Two special Bulletin Boards—one at the Battery near the Aquarium and the other on Shore Road, Brooklyn, at the Narrows—will eliminate for both visitors and New Yorkers guesswork concerning the names of vessels passing in and out of New York harbor.

The Boards, specially constructed to allow for large slides bearing the name, distinguishing colors and marks and other features of vessels passing by, are being erected as a gift to the city by **John D. Reilly**, President of Todd Shipyards Corporation, 1 Broadway, New York, N. Y. The suggestion for this special service to the many thousands of people who interest themselves in the waterfront life of the city came from **Eugene Moran, Sr.**, President of the Moran Towing Company, in co-operation with the City Parks Department; **Frank J. Taylor**, President of the American Merchant Marine Institute, and **Charles Mayper**, Chairman of the Trans-Atlantic Passenger Conference.

McCormick Prize Winner

Allen H. Parker of Portland, Oregon, has been named as the winner of the McCormick Steamship Company prize in the national essay contest sponsored by the Propeller Club of the United States. Mr. Parker, 17 years old, is a senior at Jefferson High School in Portland. The subject of his essay was: "How American Shipbuilding contributes to the Prosperity of the United States." He was one of 26 winners out of 30,000 contestants. The prize offered by McCormick Steamship Company was a round trip on a McCormick vessel from San Francisco to Portland or Seattle.

Propeller Club of California

News of the Month

Final luncheon meetings of the club's first-half-of-the-year voyage included two noteworthy programs.

On May 2nd The Standard Oil Company of California presented an excellent film story entitled "A Switch in Time." Truly a Hollywood production the picture was a liberal course in Automotive Engineering and Lubrication. A record attendance responded necessitating the staging of the program at the Fairmont Hotel.

Chairman of the Day was **Charles H. Robertson,** past-president of the Club.

On May 16th **Robert H. Fouke** gave an inspired talk on "Your Nautical School." Speaker Fouke was introduced by **Capt. Cyril L. Meek.** His message was eloquently delivered and enthusiastically received.

Fouke, who heads the Board of Governors for California's own Schoolship, the California State, traced the history of the institution, recounting its survival through many unfavorable attacks of legislative groups. He appealed for the closer and more active interest of Propellers and other Northern California organizations in the Schoolship welfare.

Propellers and their guests will long remember the Spring Frolic held at the Aquatic Casino on San Francisco's mainland on the night of May 12th.

From sign-on time at seven bells until four-five hours later, there wasn't a dull moment. The turnout set a new high in attendance and the event was in every way a memorable one.

Chairman **Eddie Macfarlan** and his committee are to be congratulated for a grand party.

News of "The Bilge Club"

By William A. Mason

Lieut. Commander, U. S. Navy
(Retired)

At the annual business session of the Bilge Club on May 24, held at the Wilmington Yacht Club, **Dan Dobler,** harbor marine superintendent for the Texas Company, was elected chairman. Mr. Dobler succeeded **Arthur O. Pegg,** representative of the International Marine Paint Company, who retired from directorship as well as chairmanship after serving the club for three successive years as a director, the longest period allowed by the by-laws.

Ed Nelson of the Los Angeles Shipbuilding and Drydock Corporation was elected secretary, and **John A. Logan** of the C. J. Hendry Company was elected treasurer, succeeding, respectively, **Lloyd Moore** of General Petroleum Corporation, and **Jack Anderson.**

Directors elected included four new names and three reelections. The new directors were: **John Idom** of the Hancock Oil Company; **Fred Archbold,** surveyor in the port district for Lloyd's; **Lloyd Moore** and **Lieut. Commander William A. Mason;** the latter was appointed a short time ago to fill an unexpired term. Those reelected were **Dan Dobler,** chairman; **Al W. Johnson** of C. J. Hendry Co., and **Hampton Neergard,** consulting marine surveyor.

Tom Forster, past president of the organization, paid tribute to Mr. Pegg's work during his long term of office.

Preceding the business meeting a banquet was held, which in turn was followed by music provided by a trio. Community singing and the club's official games of cribbage and dominoes concluded the meeting.

The new chairman announced plans for the annual outdoor jamboree to be staged by the club at the Palos Verdes Country Club. Golf, tennis, baseball and other sports will be followed by a barbecue dinner. The date has been set for June 24.

Appointments to the General Committee were: **Billy Wickersham,** Honorary General Chairman; **Dan Dobler,** General Chairman; and **Joe Costello,** Assistant General Chairman. Chairmen of various committees were: **Remington Mills,** Tennis; **Jim Craig,** Rules; **Ed Hannay,** Handicap; **Lt. Comm. Wm. A. Mason,** Publicity; **Joe Nichols,** Grounds; **Hampton Neergard,** Barbecue; **Jack Malseed,** Tournament; **Harold Bowen,** Prizes; **Cap Peters,** Attendance; **Floyd Nelson,** Horseshoes; **A. O. Pegg,** Reception; and **Johnnie Idom,** Baseball.

Annual reports showed 54 new members and a $5000 balance in the treasury.

DAN DOBLER, marine superintendent of the Texas Company, newly elected chairman of the Bilge Club (front and center), surrounded by his aids-de-camp.

F-B Open House

Machinery Plant Thrown Open to Public Inspection

On Saturday, May 13, about six thousand people availed themselves of the opportunity to visit the plant of Farrel-Birmingham Company, Inc., Ansonia, Conn. The occasion was an "Open House" to provide the families and friends of the workers and the public a chance to see the inside of the plant, its facilities and the equipment used to produce the castings, rolls and heavy machinery, which are the products of the plant.

In connection with the Open House program the committee included a hobby show, in which there were fifty-six entries of hobbies of all kinds. They ranged from oil paintings, sketches, photography, coin and stamp collections, tropical fish, flowers and miniature rock gardens, puzzles and trout fishing flies to a speed boat, short wave broadcasting station in operation and song recordings played through an electric phonograph, the records having been made by an employee gifted with a fine baritone voice.

In addition to the hobby show there were also exhibits of everyday products made on Farrel-Birmingham machinery and a special exhibit of the shop safety committee and the first aid classes, so that the visitors could see that some product they used every day was helped on its way to them by Farrel-Birmingham machinery and that the company made every effort to promote the health and safety of employees.

The company maintains an unusually effective course of apprenticeship training and the apprentices had a hobby show of their own, displaying tools and tool boxes made for their own personal use as well as coin collections, handmade curtains, etc. An exhibit also demonstrated the progress of apprentices throughout their courses.

The Open House program was managed entirely by the employees of the company through employee committees of their own selection, the management acting in an advisory capacity only and arranging for certain facilities at the disposal of the company. Employees acted as guides to direct visitors on the tour of the plant.

Steamboaters Picnic

The 14th Annual Reunion of the Veteran Steamboatmen's Association will be held at Champoeg Park on Sunday, June 25th. An old-fashioned picnic will lure the old-timers.

The V.S.A. is a picturesque group numbering many of the Steamboaters from early pioneer days. Officers are:

Commander	Capt. John W. Brown
Port Captain	Capt. Fred Sherman
Master	Capt. Arthur Riggs
Pilot	Capt. Eugene Hayden
Pilot	Capt. Walter Monical
Pilot	Capt. Charles Nelson
Purser	Sara Riggs
Chief Mate	Capt. Ray Mooney
Mate	Capt. Widler McClintock
Second Mate	Otis Cole
Pay Master	Capt. Clyde Rabb
Port Steward	William Rofeno
Steward	William Lacy
Second Steward	John Koskey
Freight Clerk	Mabel Swingley
Designer and Builder	Thos. Barbare

Quarter Masters:
- Edward Patterson
- George Whitehead
- Hiram Thurber

Engineers Department

Master Mechanic	William E. Harris
Port Engineer	A. B. Andrews
Chief Engineer	James Healy
First Assistant	William Linn
Second Engineer	Antone Anderson

Board of Directors:
- C. E. Steelsmith
- Capt. S. V. Winslow
- Capt. Leonard Hosford
- George Barden
- Capt. W. E. Jones
- Capt. Thomas Harmon

Historian	Capt. F. J. Smith
Master of Ceremonies	Judge Fred W. Wilson

Fore!

Frank Jansen, chairman, with aides Herriot Small and George Parrish, comprised the committee which arranged the highly successful Tenth Annual Golf Tournament of the Association of Marine Underwriters, San Francisco.

Orinda Country Club was the locale. The event was held on May 25th. Golfers banqueted in the evening.

Old Friend

San Francisco, May 9: The famed del Poza de Verona, the 600 acre estate of the late Phoebe Apperson Hearst in Pleasanton, now the Castlewood Golf and Country Club, has been taken over under the management directorship of **Walter H. Ramage**, it was announced here, and will henceforth be open to the public as an exclusive resort with all the country club facilities. The present membership will remain intact.

Ramage is well known in California business and social circles. He was formerly passenger manager for the old Oceanic Steamship Company, assistant manager of the Hotel St. Francis and more recently manager of the San Francisco Commercial Club.

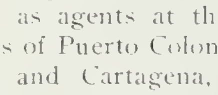
AMERICAN-HAWAIIAN PERSONNEL CHANGES

After establishing a splendid reputation in Eastern intercoastal freight circles through his activities as district manager for American-Hawaiian in Baltimore, **A. E. Stow** has returned to San Francisco to take over the post of operating manager in that city. He was one of the best-known yachtsmen in Bay sports before being transferred to Baltimore, and served his company under vice president **Thomas G. Plant**, as assistant to the latter.

J. A. Fraser, former general claim agent at San Francisco, has taken over Mr. Stow's berth in Baltimore, himself being succeeded by **W. L. C. Brown**, previously with the operating department.

McCORMICK APPOINTMENT

McCormick Steamship Company and its subsidiary, Pacific Argentine Brazil Line, announce the appointment of Corporacion Maritima Colombiana as agents at the Colombian ports of Puerto Colombia, Barranquilla and Cartagena, effective May 1st. Corporacion Maritima Colombiana is a subsidiary of the Grace Line.



Names and News

CAPT. KARL A. AHLIN

At the end of over half a century of service, Capt. Karl A. Ahlin on May 5 retired from his command of the President Coolidge, American President Lines ship, after commanding her since she was commissioned in 1931. Capt. Ahlin, who ranked as commodore of the line, comes from a long line of sea veterans. He was born in Sweden and spent fifty-three years at sea, arriving in the United States when a youth to become a citizen. For many years he was in command of Swayne and Holt vessels, and in 1923, when the President Hayes and President Harrison were purchased from that company by the old Dollar Line, Capt. Ahlin entered the service of the latter with his ship, the President Harrison.

With the inception of Dollar's round-the-world service in January, 1924, Capt. Ahlin blazed the trail with his ship. During the World War he commanded the Camino, first Belgian relief ship sent from the West Coast to Europe.

Command of the Coolidge has been bestowed upon **William O. Kohlmeister,** former master of the President Pierce and President Cleveland. He, too, is a veteran of the sea, once single-handed saving a shipment of $2,000,000 in gold from pirates who sought to rob the old steamer Buckman when she was off the Oregon coast.

ABE MARKS

On June 19 Abe Marks, secretary manager of the Marine Exchange of the San Francisco Chamber of Commerce, will retire from active duty with that organization, culminating 50 years of service. He will, however, be on call for service in an advisory capacity through special arrangement with the Chamber.

Mr. Marks came to California Street in June, 1889, as a lad of fifteen. Applying to Capt. H. T. Emery, then head of the Exchange, for a job he was immediately employed as a messenger. His duties at that time are of interest in comparison with the facilities of present day business. A telephone connected the Exchange with the lookout station on Point Lobos. When a ship was sighted, the station telephoned the Exchange with the news, and young Marks jumped on a horse always hitched outside of the building and bore the tidings to interested parties—the owner, Government authorities, and stevedores who were to unload the vessel. These parties were usually widely separated and in most cases had no telephones, so this service was a necessity.

Mr. Marks has been manager of the Exchange since 1924, and has kept detailed records of every maritime disaster on the Coast since his connection with the organization. A semi-legal status has been accorded him by many admiralty attorneys and underwriters for accurate information he has been able to furnish them.

We wish Mr. Marks a very happy retirement, but hope that he will still be much in evidence along California Street.

STUART HENSHAW

It is with deepest sorrow that we chronicle the passing of **Stuart T. Henshaw**, sales manager of Tubbs Cordage Company.

Mr. Henshaw, a resident of Piedmont, earned the close friendship of hosts of Pacific Coast maritime men. His untimely death occurred on May 12th, the result of an automobile accident.

CAPT. JAMES McDONALD

On April 4 Capt. James McDonald, after thirty years of service with Luckenbach Steamship Company, passed away at the age of sixty-seven at his home in Oakland. He had retired a year ago owing to ill health.

Capt. McDonald had an enviable record in the merchant marine and served meritoriously during the World War.

AMERICAN MAIL LINE

One of the most interesting marine developments of the past few months on the Pacific Coast is the proposed revival of the American Mail Line between Puget Sound and the Orient, using the five vessels of the old American Mail Line that are now laid up.

Creditors of the American Mail Line are petitioning for a reorganization of the corporation into a new firm that will secure ample financial backing, apply for an operating subsidy, and operate the ships.

The vessels involved are the steamers President Grant, President Jackson, President Jefferson, President Madison and President McKinley. These steamers are all of the type known as 535 - U. S. Shipping Board Emergency Fleet Corporation, the 535 being their overall length in feet. Steamers President Grant and President Jefferson have geared turbine propulsion plants, the rest are driven by reciprocating engines. The power plants develop 12,000 horsepower and drive the ships at 17 knots.

These vessels, now lying idle, are much better suited to the trade than the Hog Island type Scantic Line cargo ships proposed by the Maritime Commission, and furthermore their reconditioning will give some much-needed work to Pacific Coast shipyards.

CHARLES H. CUMMINGS

A veteran shipbuilder of Long Beach, Charles H. Cummings passed away at his home in that city the early part of last month at the age of 78 years. He had retired in 1920, terminating a 40-year career in shipbuilding.

● ●

Keeping them Posted!

Shipowners, operators, and ship builders find in the pages of PACIFIC MARINE REVIEW a very complete coverage of news pertinent to their jobs!

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Air conditioning and refrigerating equipment is used on these vessels for four primary applications:

(a) Extensive cargo refrigeration.
(b) Air conditioning.
(c) Refrigeration of ship's stores and ice-making.
(d) Cooling of drinking water.

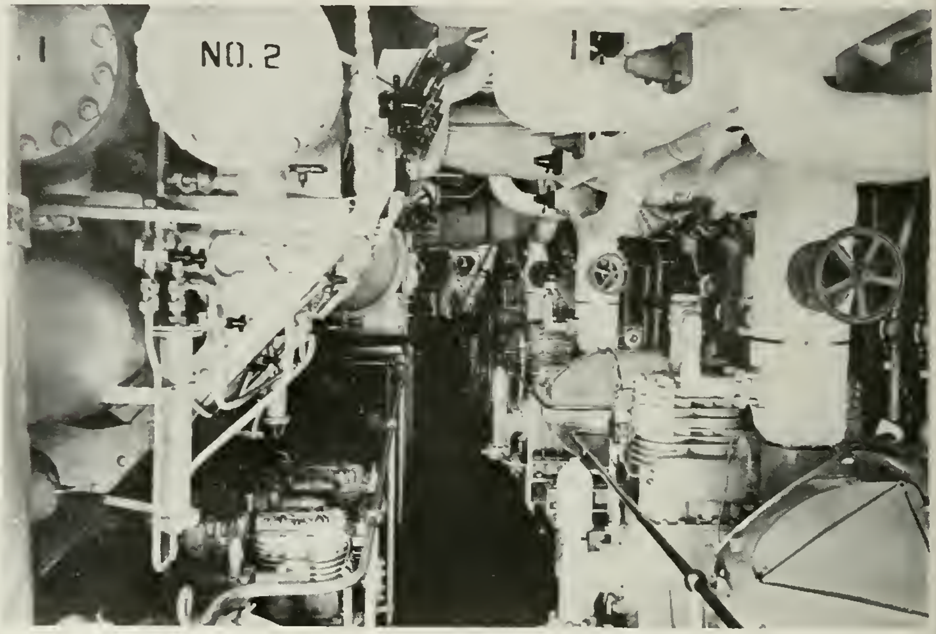
The cargo refrigerating system has been installed and designed primarily for bananas but arranged so as to be suitable for transporting every type of refrigerated cargo. Certain of the spaces are also equipped for temperatures as low as 0° if required. For all of these purposes Carrier equipment is installed.

To supply the necessary refrigeration, there are installed four Carrier Freon refrigerating units, motor-driven, of the latest design arranged for marine service. Three of these units are assigned to effect the necessary cooling of the refrigerated cargo and the fourth unit is used for air conditioning the dining saloon.

The equipment is very flexible to take care of all possible load variations and is arranged so that one compressor can operate on different compartments to eliminate the possibility of interrupting the refrigerating service in case of a breakdown of one machine.

The system uses Freon as a refrigerant and complete temperature controls are provided for all refrigerated compartments.

Each refrigerated space is provided with two Carrier Cold Diffusers, and the air is distributed through specially designed ducts so arranged that the air is forced through the entire cargo eliminating the possibility of any hot pockets or appreciable temperature variation.



Refrigeration machinery on the S. S. Panama.

All cargo compartments are provided with outside ventilation to keep the cargo in first-class condition and eliminate an excessive concentration of carbon dioxide or other gases.

The refrigerated compartments used for ship's stores are cooled by means of two Carrier refrigerating units arranged with full automatic control. Each box is also provided with individual temperature control, automatic, and in addition a Carrier Cold Diffuser has been provided for the vegetable compartment to insure proper air circulation and cooling.

Sufficient ice may be manufactured in a specially designed marine unit to insure a constant supply throughout an entire voyage.

Drinking water for passengers and crew is cooled and circulated throughout the vessel by an automatic operation Freon refrigerating unit.

To insure the utmost in comfort for the passengers, the dining saloon is air conditioned with two Carrier marine type air conditioning units. The air conditioning equipment will not only cool and dehumidify the air but will also heat the air and provide full ventilation when neither heating or cooling is required. A filter provides means of cleaning the circulated air and a constant supply of outside air insures a clean, pure atmosphere at all times.

For cooling the crew's mess rooms, officers' lounge, barber shop and nurse's quarters, there have been installed small Carrier individual self-contained air conditioning units that require a minimum of space and provide ample cooling and dehumidification to insure comfortable conditions.

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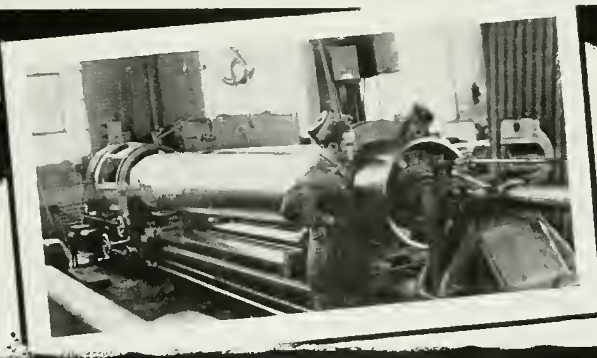

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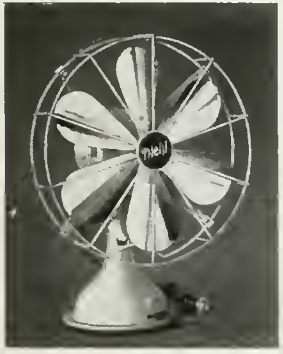

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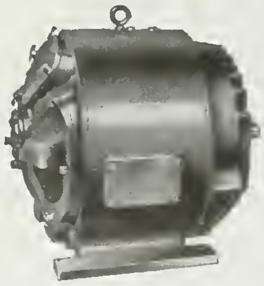

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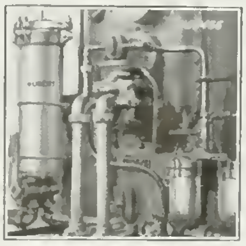

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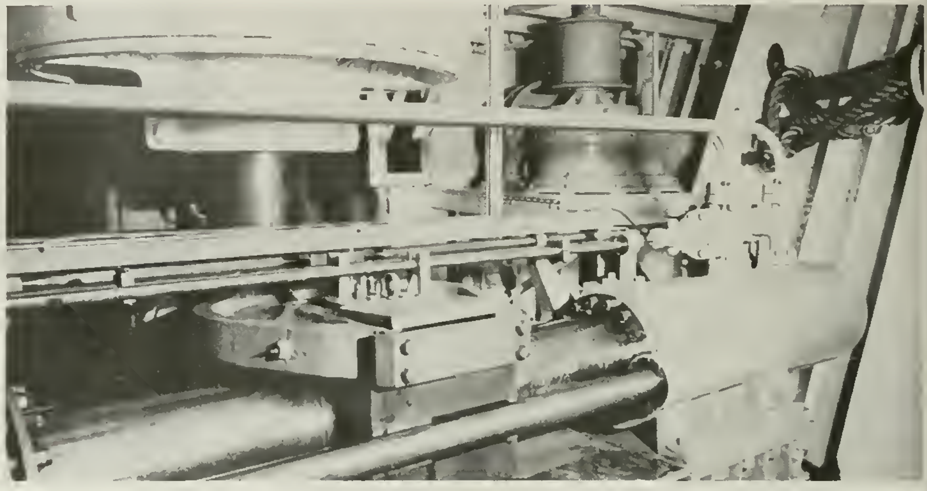
Deck Auxiliaries on Most Modern American Steamer

The Lidgerwood electro-hydraulic steering gear of the solid single ram Rapsom type incorporates the most modern improvements tending for safety at sea and multiplicity of steering control. Dual power plants each consisting of a motor driven variable stroke pump have independent piping to the two simultaneously operated change over valves mounted on each cylinder. In addition to the mechanical rudder brake, an efficient hydraulic brake is provided and either or both power plants may run idle when the brakes are in use.


Steering gear on the S. S. Panama.

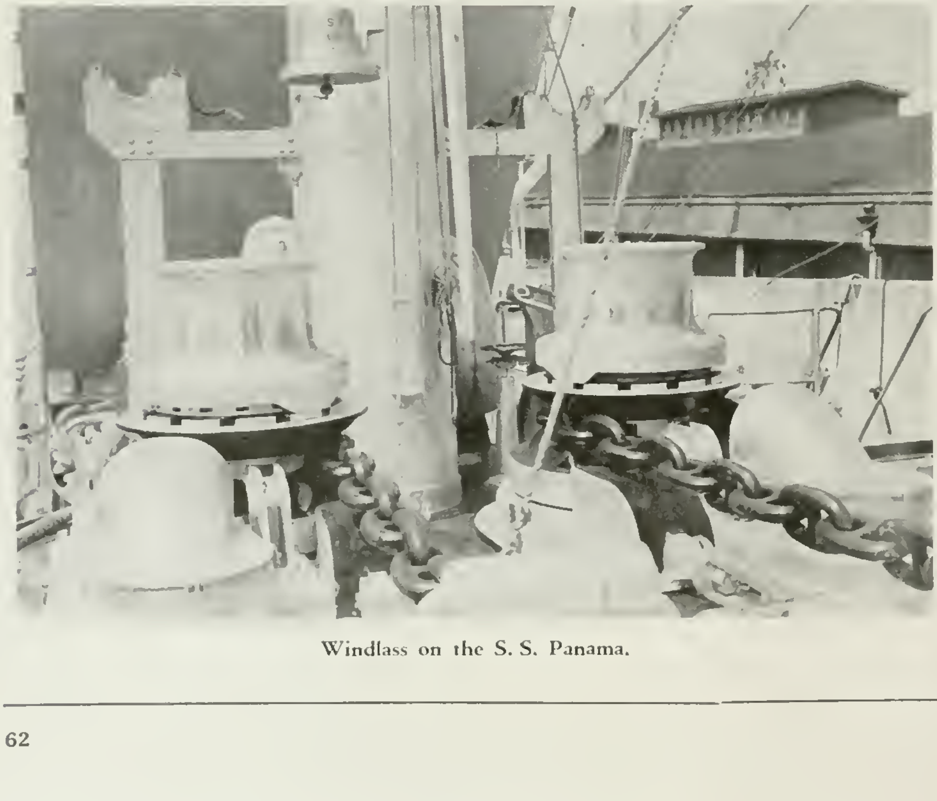
Both pumps are stroked simultaneously and both may be running at the same time, one for operating the gear and the other running idle with its oil by-passed. For stroking the pumps a full storage motion springless follow-up control is provided operated at the gear by the trick wheel, from the aft steering station by shafting, and from the pilot house by either the hydraulic telemotor or Sperry Gyro-pilot. In addition, in case of failure of all these control means, the pumps may be stroked by hand.

With the storage motion control, in case the rudder takes charge for any reason whatsoever, the rudder can get out of step with the steering wheels the full amount of rudder travel, and when the rudder is again under control, it will automatically return to the steering wheel position.

A locking head is provided in the follow-up system, which may be quickly disconnected to make the system non-follow-up. Mechanically operated automatic by-pass valves are provided for stopping the gear before the rudder stops take effect. The ram and rudder crosshead design automatically provides for wear of the rudder carrier ring and for upward shocks on the rudder stock.

The Lidgerwood improved hydraulic telemotor provides for automatic instantaneous make-up, expansion and contraction of oil at all rudder angles and temperatures; non-magnetic monel metal rams to provide for long wear; and an improved filling system which automatically purges the system of air.

The Lidgerwood windlass consists of two independent vertical units, the power plants being below deck, and the wildcats on deck above. Each unit is driven by its own electric motor, and further arranged so that either motor can drive either windlass. The drive between the motor and wildcat consists of high speed worm gearing and low speed spur gearing, the worm gearing being entirely enclosed in an oil tight housing of special design to prevent leakage of oil along the bearings. The capstan head on top of each wildcat may be operated while the wildcat is stationary.


Windlass on the S. S. Panama.

Western Electric
VOICE-POWERED
TELEPHONE

Approved for shipboard use by the U. S. Dept. of Commerce

NEEDS NO BATTERIES

Developed for intercommunication on shipboard, this simplified telephone is powered by the speaker's voice alone.

Bell Telephone Laboratories designed this rugged, dependable telephone to give high quality transmission between as many as six locations on board.

Since each unit is completely independent of the ship's power supply, this system is ideal for emergency as well as routine use.

GRAYBAR ELECTRIC CO., Graybar Building, New York. PMR-6-39
Gentlemen: Please send me bulletin describing the new Western Electric 11A Voice-Powered Telephone.
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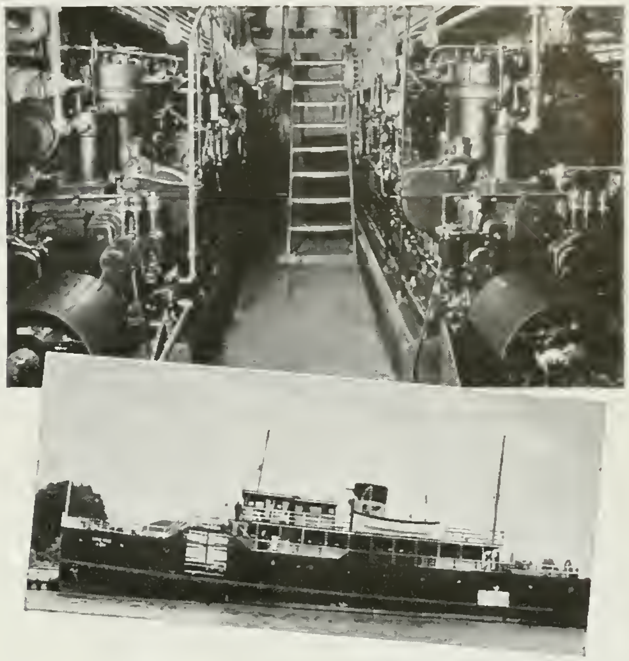
CITY.. STATE..........................

F-M DIESEL CASE HISTORIES



Why Capt. McQueen Specified F-M Diesels for New Motorship *Erie Isle*

Back in 1936 Captain J. Earl McQueen, marine contractor of Ontario, converted his tug *Patricia McQueen* from steam to Fairbanks-Morse Diesel power, using a six-cylinder Model 35-E for propulsion and a one-cylinder Model 36 for auxiliary service.

These engines proved so economical and reliable that Captain McQueen specified two 240-hp. six-cylinder Model 35-E F-M Diesels for propulsion in his new motorship *Erie Isle.* This motorship is 146 feet long and 26 feet on the beam. She will accommodate 500 passengers, 20 automobiles, and 200 tons of freight. The two F-M Diesels give her a speed of 18 m.p.h.—or more than 15½ knots.

Whether you build or convert—get complete information on F-M Marine Diesels for propulsion or auxiliary service and the advantage of the broadest Diesel experience. Write Fairbanks, Morse & Co., Department 109, 600 S. Michigan Ave., Chicago, Ill. Branches with service stations in principal ports.

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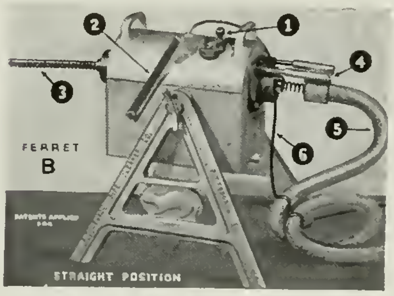
AIR CONDITIONING

F M Diesels

Mechanical Ferrets For Cleaning Pipes



The Pittsburgh Pipe Cleaner Company has developed two motor-driven "ferrets" for opening and cleaning clogged pipes of all kinds, coils, sewers and drains.

By working through traps, elbows, tees and U turns, and rapidly clearing up obstructions of all types, these machines do away with rodding and slow, expensive disassembling operations in marine sanitary and other pipe lines.

The "ferrets" are also being used to clean superheat tubes, oil and gas lines, heating coils, cooling coils and water lines.

Operation of the ferret consists of fitting a 15′ length of helically coiled cable into a pipe, depressing clutch to spin cable, releasing clutch, and feeding again. Length after length of cable is added as required by means of a special coupling. The rapid rotation of the cable scours the line and clears up ordinary obstructions. Cutting tools, brushes and special detachable drills are provided for cutting out such obstinate obstructions as corrosion and hard scale. Ferret cables are manufactured to strict specifications so as to give toughness, flexibility, and long life.

The accompanying illustration indicates the salient construction features of the larger machine, designated as Model B: (1) Electric switch to rotate cable; to start, reverse and stop motor. (2) Clutch handle which operates clutch jaws for gripping and rotating cable. (3) Outlet of ferret cable to pipe. (4) Slip joint connection for rear cable guard. (5) Fifteen-foot guard for slack end of rotating cable . (6) Electric connection wire with special rubber insulation which meets Underwriters' specifications. There are two handles for convenient carrying and shifting. The base is detachable. The body of the machine is 14″ high, 12½″ wide and 20″ long. Weight is 85 lbs. It takes cable sizes of 1″, ¾″ and ½″, which operate on ¾″ to 8″ diameter pipe.

Ferret Model "A" is small, compact and easily carried. It is identical in operation to ferret "B." It is provided with the same type of tools in smaller sizes for smaller pipes or tubes, and is used on ⅜″ to 2″ diameter pipe. It weighs 45 lbs.

New Portable X-Ray Flaw Dectector

The latest weapon in the inevitably victorious campaign against flaws in industrial products, a 220-KV portable X-ray flaw detector, recently was placed in service in examining structural welds and heavy castings on production lines at the East Pittsburgh works of the Westinghouse Electric & Manufacturing Company.

The technique of radiographic diagnosis of large steel parts is expected to be much simplified by this 4500-pound portable X-ray camera, since it may be wheeled along production lines to maintain the quality of machines during their manufacture.

Shockproof, completely self-contained, ready for work wherever there is a proper power supply, it generates X-rays with a penetrating quality sufficient for them to pass through three inches of solid steel. The focusing mechanism on the new equipment is extremely flexible, so that the apparatus may be aimed at a weld or casting in either a horizontal or vertical position.

X-ray tube, transformer, capacitors, and flexible focusing device are all compactly mounted on a chassis with four balloon tires, automobile springs, and two-wheel mechanical brakes, enabling two men to move the apparatus in safety.

Universal Pitchometer Patented

A universal pitchometer, for determining the pitch of existing ship propellers, either on or off the shaft, and setting the pitch of adjustable blades of built up wheels, has been invented and patented by Thomas P. Fowler, superintendent of construction, in the marine engineering and construction division of the Lighthouse Service. Among the advantages which Mr. Fowler claims for his invention are lightness and portability; practicability of working on ships either in drydock or on a marine railway or without the aid of docking facilities, even in the case of large vessels; and of carrying on work without removing either the propeller or its nut from the shaft.

Mr. Fowler contemplates that the pitchometer would be made in two sizes, the smaller size to handle propellers from 14 inches to 8 feet in diameter; and the larger size to accommodate propellers of from 8 feet to 23 feet in diameter. Patents on this invention have been granted in the United States, England and France.

A New Duplex Welding Hose

Condor Duplex Welding Hose, a development of The Manhattan Rubber Mfg. Division, is a highly practical twin hose designed to make welding safer and more efficient than is possible with separate oxygen and acetylene lines.

In the construction of Condor Duplex, two hose lines are held together by a permanent web joint, integrally molded and having great strength and flexibility. The joint prevents tangling, kinking and snagging while the hose is in use. The ends are separated 18″ for the torch end and 24″ for the tank end for ease in making connections and in handling.

This hose may be obtained in either one or two braid, or in heavy duty braid and spiral cord construction, depending upon the working pressures used.

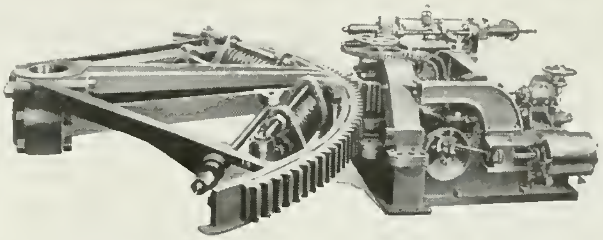
Features in the construction of the hose are strong inner tubes that are smooth and non-porous and tough, flexible covers that have a maximum resistance to abrasion and aging. Covers are furnished corrugated and colored red and green to distinguish the oxygen from the acetylene line.

U. S. S. CIMARRON

EQUIPPED

High speed national defense features tanker. U. S. S. Cimarron, built by Sun Shipbuilding & Dry Dock Company under contract with the Standard Oil Company, sold to the U. S. Navy. ● *A-E-CO equipment: 16" x 12" spring quadrant type steering gear; one 13" x 14" triple spur-geared windlass; one 12" x 12" and three 9" x 12" compound gear winches.* ● *Other recent ships built by Sun Ship, and A-E-CO equipped:* MOBILOIL, MOBILGAS, WALLACE E. PRATT, ESSO BAYTOWN, W. H. BERG, H. D. COLLIER *and* ASSOCIATED. *When it's A-E-CO, it's dependable.*

Other A-E-CO Products: Lo-Hed Hoists, Hele-Shaw Fluid Power, Taylor Stokers.



A-E-CO Spring Quadrant Steerer for the U. S. S. Cimarron.

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Pacific Coast

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Shipbuilding Division
(Union Plant)
San Francisco

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THE CAMPBELL MACHINE CO.
Foot of Eighth St.
San Diego, Calif.

DRYDOCK AND ROUTINE REPAIRS: **Olympia, Sao Joao.**

FELLOWS & STEWART, INC.
Wilmington, Calif.

DRYDOCK AND ROUTINE REPAIRS: **Glass bottomed boats Phoenix and Princess; Blanche W., Betty O., Fish and Game Comm. research cruiser Schofield, purse seiner Western Spirit, purse seiner Ocean Gift; yachts Melinda, Seyellyn II, L'Apache and Hispanola; 72 smaller yachts and commercial boats for overhaul.**

GENERAL ENGINEERING & DRY DOCK CO.
Foot of Fifth Avenue
Oakland, Calif.

DRYDOCK AND ROUTINE REPAIRS: **Washingtonian, Ohioan, Oklahoman, oil s. Chilkat, el. s. San Leandro, Ryder Hanify, gas. s. Rose Marie, carfloat Santa Fe No. 3, Noyo, Mapele, gas. s. Dux, tug Humaconna.**

HARBOR BOAT BUILDING CO.
Berth 264, Fish Harbor
Terminal Island, Calif.

NEW CONSTRUCTION: **Two 40-foot high speed fishing cruisers. Completion date April 15, 1939.**

HONOLULU IRON WORKS
Honolulu, T. H.

DRYDOCK AND ROUTINE REPAIRS: **U.S.C.G.C. Taney, President Harrison, Mericos H. Whittier, U.S.C.G.C. Reliance, Dickenson.**

LAKE WASHINGTON SHIPYARDS
Houghton, Wash.

NEW CONSTRUCTION: **200 foot steam geared turbine steel survey ship Explorer for U. S. Coast & Geodetic Survey.** Estimated delivery date January 1, 1940.

Timber work on two caissons for Tacoma Narrows Bridge.

DRYDOCK AND ROUTINE REPAIRS: **Ogantz.**

LOS ANGELES SHIPBUILDING & DRY DOCK CORP.
Los Angeles Harbor
San Pedro, Calif.

DRYDOCK AND ROUTINE REPAIRS: **J. S. Coney, Griffco, Catalina, M.V. Vaquero, Lawrence Philips, Yacht Happy Days, M.V. Korrigan IV, Brandywine, F.B. Johnnie Boy, Yacht Volador, U.S.C.G.C. Itasca, Barge WORCO No. 1, Lurline Burns, La Purisima, M.V. Suruga Maru, Cascade, M.V. Gefion.**

MARE ISLAND NAVY YARD
Mare Island, Calif.

NEW CONSTRUCTION:

Swordfish, Submarine (SS193); keel laid October 27, 1937; estimated launching date April 1, 1939; estimated delivery date August 1, 1939.

Two harbor tugs, YT 133 and YT 134; keels laid September 29, 1938.

Garbage Lighter (YG 21); keel laid July 25, 1938.

Order received for construction of one submarine tender, Fulton (AS 11); dated June 30, 1938.

Order received for construction of one submarine, Tuna (SS203); dated June 30, 1938.

DRYDOCK AND ROUTINE REPAIRS: **Clark, Cassin, Conygham, Downes, MacDonough, Worden, Partridge, Unadilla, Dobbin, Eagle No. 32, Ard-1, Pollack, Plunger, Permit, Cachalot, Cuttlefish, Duane.**

THE MOORE DRY DOCK CO.
Oakland, Calif.

NEW CONSTRUCTION:

Hulls Nos. 193 and 194, two lighthouse tenders for Bureau of Lighthouses; LOA 174′ 10½″, beam molded 32′, depth 14′ 6″. Twin screw triple expansion engines; water tube boiler; 1000 horsepower. One for Pacific Coast; one for Great Lakes. Keel for first ship laid December 5, 1938. Launched March, 1939.

Hulls Nos. 195 and 196, two cargo vessels for U. S. Maritime Commission; LOA 492′ 0″, LBP 465′, breadth molded 69′ 6″, depth molded 42′ 6″, SHP normal 8500, SHP max. 9350, dis. 17,600 tons, deadweight 11,926 tons; steam turbine propelled. No. 195, keel laid March 18, 1939.

DRYDOCK AND ROUTINE REPAIRS: **P. S. Eneas, Hamlin F. McCormick, Iowan, O. A. Brodin, Gracie S., Lumberman, Blue Water, Montanan, Silveray, Pennsylvanian, Dauntless, Peter Helms, Seattle, American, Alice, Silversandal, Silverwillow, Portland, Western Union Cable Barge, Weimea, Olopana, Pomona, P. S. El Capitan, Coloradan, Manukai, American Star, Madrona, Tacoma, Oregonian, Thor I, Delarof, Pacific Ranger, Modjokerto, P. S. El Commodore, Etolin, Bering, Glacier, Port Ancha, Fir.**

THE PUGET SOUND NAVY YARD
Bremerton, Washington

NEW CONSTRUCTION:

U.S.S. Wilson (Destroyer No. 408); standard displacement, 1500 tons; keel laid March 22, 1937; launched April 12, 1939.

U.S.S. Charles F. Hughes (Destroyer No. 428); standard displacement 1600 tons; order placed by Navy Department December 7, 1937. Keel laid January 3, 1939.

Ships authorized, work not started: Woban (YT138), harbor tug; Ala, (YT139), harbor tug; Barnegat (AVP10), seaplane tender; Biscayne (AVP11), seaplane tender; Monssen (DD436), destroyer.

DRYDOCK AND ROUTINE REPAIRS: **Nevada, Maryland, Saratoga, Salt Lake City, Pyro.**

TODD SEATTLE DRY DOCKS, INC.
Harbor Island
Seattle, Wash.

DRYDOCK AND ROUTINE REPAIRS: **M.S. Northland, M.S. Nordhval, Stanley A. Griffiths, Baranof, Coloradan, Denali, Wind Rush, Dagmar Salen, Point Caleta, Point Lobos, J. L. Luckenbach, North Haven, Lillian Luckenbach.**

WESTERN BOAT BUILDING CO., INC.
2505 East 11th Street
Tacoma, Wash.

NEW CONSTRUCTION:

Hull No. 134, tuna clipper 90′ x 24′ x 13′; 275 H.P. Union Diesel. Launching date February 15, 1939.

Hull No. 136, purse seine fishing boat 96′ x 22′, powered by 240 H.P. Atlas Diesel engine. Keel laid January 30, 1939; launching date March 1, 1939.

Atlantic, Lakes, Rivers

AMERICAN BRIDGE COMPANY
Pittsburgh, Pa.

NEW CONSTRUCTION:

Six standard coal barges 175′ x 26′ x 11′, for builder's account.

HUNT-SPILLER

Air Furnace Gun Iron

A special material built to meet severe requirements. Its uniform quality and unsurpassed wear-resisting properties insure maximum service, highest efficiency, minimum fuel consumption and low maintenance costs.

Steam or Diesel—You need something more than ordinary material to combat the severe action of high temperatures and high pressure developed inside the cylinders of your engines.

Application of HSGI liners, heads, pistons and piston rings to your main or auxiliary engines offer big savings in cost of operation.

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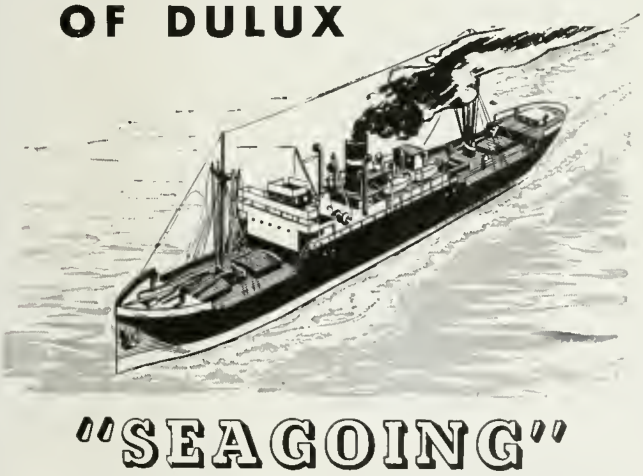
HUNT-SPILLER *Air Furnace* GUN IRON

ONE-WORD SUMMARY OF DULUX



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Distributors and Applying Contractors
Portland Seattle Tacoma Spokane

Eleven coal barges with double steel bottom 195' x 35' x 11', for Central Barge Co., Chicago.

One relay barge 104' x 34' x 8' for the Panama Canal. Delivery date January 1, 1940.

Fifteen double deck covered barges 198' x 35" x 11' for Mississippi Barge Line Co., St. Louis, Mo.

BATH IRON WORKS
Bath, Maine

NEW CONSTRUCTION:

Hulls Nos. 170-171, DD409, Sims, and DD410, Hughes, two 1500-ton destroyers for U. S. Navy; contract date October 12, 1936; keels laid July 15 and September 15, 1937, respectively; **launching dates,** April 8 and **June 17,** 1939, respectively; **delivery dates, June** and August, 1939, respectively.

Hulls Nos. 177 and 178, DD423 and DD424, two 1620-ton destroyers for U. S. Navy. Contract date September 30, 1937; delivery dates April and June, 1940, respectively.

Hulls Nos. 180-181, DD429 and DD430; two 1620 ton destroyers for U. S. Navy. Contract dated August 15, 1938; delivery dates, December, 1940, and February, 1941, respectively.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Fore River Yard
Quincy, Mass.

NEW CONSTRUCTION:

CV7, Wasp, Airplane Carrier for U. S. Government; keel laid April 1, 1936; launched April 4, 1939.

Hulls Nos. 1467, Panama; 1468, Ancon; and 1469, Cristobal; three passenger and freight steamers for Panama Railroad S.S. Co.; 486 feet x 64 feet x 38 feet 6 inches; 16½ knot speed. Keels laid, Nos. 1467 and 1468, October 25, 1937; No. 1469, November 15, 1937; launching dates, September 24, 1938, December 10, 1938, and March 4, 1939. **No. 1467 delivered April 21, 1939.**

Hulls Nos. 1470 and 1471, two 1500-ton destroyers for U. S. Government; delivery dates March, 1940 and May, 1940.

Hulls Nos. 1474, 1475, 1476 and 1477, four freight vessels for American Export Lines, Inc.; 450' B.P. x 66' x 42'3"; 16½ knots; geared turbines and water tube boilers. Keel laid No. 1474, November 10, 1938; No. 1475, December 16, 1938; No. 1476, March 16, 1939.

Hull No. 1478, Massachusetts; 35,000 ton battleship for U. S. Navy.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Sparrows Point Yard
Sparrows Point, Md.

NEW CONSTRUCTION:

Hulls Nos. 4329, 4330, 4331; three 16,300 dwt. ton tankers for Standard Oil Co. of N. J.; 18 knots speed. Contract signed January 3, 1938.

Hulls Nos. 4332, Mobilfuel, and 4333, Mobilube; two 16,100 dwt. tankers for Socony Vacuum Oil Co. Contract signed February, 1938. No. 4332 launched February 25, 1939; No. 4333 launched April 29, 1939

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Staten Island Yard
Staten Island, N. Y.

NEW CONSTRUCTION:

Hulls Nos. 8001, Navajo; 8002, Seminole; and 8003, Cherokee—three U. S. Navy fleet tugs. No. 8001, keel laying date December 12, 1938; launching date September 15, 1939; delivery date February 15, 1940. No. 8002, keel laying date December 16, 1938; launching date November 15, 1939; delivery date April 15, 1940. No. 8003, keel laying date December 23, 1938; launching date January 15, 1940; delivery date June 15, 1940.

BOSTON NAVY YARD
Boston, Mass.

NEW CONSTRUCTION:

DD402, Mayrant, and DD403, Trippe, two light destroyers for United States Navy; LBP 334', beam 35'6" depth 19'8"; keels laid April 15, 1937; launched May 14, 1938; estimated delivery dates indefinite.

DD415, O'Brien, and DD416, Walke, two destroyers; LBP 341', beam 36', depth 19'8"; keels laid May 31, 1938; launching date September, 1939; delivery dates May, 1940, and July, 1940.

DD425, Madison, and DD426, Lansdale, two destroyers; 341'0" x 36'0" x 19'8". Keel laying date December 19, 1938; launching date September, 1939; delivery dates August and December, 1940.

DD433 and DD434, two destroyers, 341'0" x 36'0" x 19'8", contract awarded July 23, 1938. **Keel laying date June, 1939;** completion dates June and August, 1941.

BROOKLYN NAVY YARD
Brooklyn, N. Y.

NEW CONSTRUCTION:

CL 50, Helena, light cruiser; L.B.P. 600' beam 61'7¾", standard displacement 10,000; geared turbine engines; express type boilers; keel laid December 9, 1936; launched August 27, 1938; estimated delivery November 2, 1939.

BB 55, North Carolina, battleship; L.B.P. 714' 0", beam to outside armor 108' 0", std. displ. 35,000 tons; geared turbine engines; express type boilers. Keel laid October 27, 1937; estimated launching date March 1, 1940; contract delivery September 1, 1941; estimated delivery date October 15, 1941.

CHARLESTON, S. C., NAVY YARD
Charleston, S. C.

NEW CONSTRUCTION:

One harbor tug, Massasoit (YT131); LOA 110', beam 24'; authorized August 12, 1937; keel laid July 25, 1938; launched December 13, 1938.

One harbor tug, Heekon (YT141); LOA 100', beam 25'; authorized July 7, 1938.

One harbor tug, Nokomis (YT142); LOA 100', beam 25'; authorized July 7, 1938.

Four destroyers.

DEFOE BOAT & MOTOR WORKS
Bay City, Mich.

NEW CONSTRUCTION:

Hulls Nos. 72 and 73; two diesel electric harbor cutters for Coast Guard; 110' x 26' 6"; powered by 1000 S.H.P. General Motors engines; steel construction. **Delivery date April, 1939.**

THE DRAVO CORPORATION
Engineering Works Division
Pittsburgh, Pa., and Wilmington, Del.

NEW CONSTRUCTION:

Hull No. 1489, one welded ash removal barge for Dept. of Sanitation, City of N. Y.; 150' x 37'; 553 gross tons.

Hull No. 1543, one 25-ton floating crane for Navy Dept. Bureau of Yards & Docks; 335 gross tons.

Hulls Nos. 1549-1555, seven welded steel coal barges 175' x 26' x 10' 8" for stock; 3304 gross tons.

Hulls Nos. 1560-1561, two double bottom cargo barges 175' x 26' x 11' for stock; 1060 gross tons.

Hulls Nos. 1562-1567, six welded flush deck cargo box barges 100' x 26' x 6' 6" for stock; 990 gross tons.

Hull No. 1568, one pontoon type whirler boat 60' x 53' 2" x 7' for stock; 188 gross tons.

Hulls Nos. 1569-1572, four welded flush deck cargo box barges 130' x 30' x 7' 6" for stock; 1000 gross tons.

Hulls Nos. 1573-1574, two welded steel coal barges 134' x 34' x 17' for stock, 1534 gross tons.

Hulls Nos. 1575-1577, three welded steel oil barges 195' x 35' x10' 6" for stock; 1833 gross tons.

ELECTRIC BOAT CORP.
Groton, Conn.

NEW CONSTRUCTION:

Hull No. 31, Spearfish (SS190); standard displacement 1450 tons; keel laying date September 9, 1937; launching date October 29, 1938; delivery date July 17, 1939.

Hull No. 33, Seadragon (SS194); 1450 tons; keel laying date April 18, 1938; launched April 21, 1939; delivery date December, 1939.

Hull No. 34, Sealion (SS195); 1450 tons; keel laying date June 20, 1938; **launched May 25, 1939;** delivery date February, 1940.

Hull No. 35, Tambor (SS198); standard displacement 1475 tons; keel laying date January 16, 1939; delivery date January, 1941.

Hull No. 36, Tautog (SS199); standard displacement 1475 tons; keel laying date March 2, 1939; delivery date March, 1941.

Hull No. 37, Thresher (SS200); standard displacement 1475 tons; keel laying date May 15, 1939; delivery date May, 1941.

THE FEDERAL SHIPBUILDING AND DRY DOCK COMPANY
Kearny, N. J.

NEW CONSTRUCTION:

Two destroyers, DD411 Anderson and DD412 Hammann; keels laid November 15, 1937, and January 17, 1938, respectively; launching date February 4, 1939.

Hulls Nos. 151, 152 and 153, three tankers for Standard Oil Co. of New Jersey; keels laid, No. 151, July 1, 1938; No. 152, July 15, 1938; No. 153, March 13, 1939. Launching dates, No. 151, March 4, 1939; No. 152, April 29, 1939.

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Hulls Nos. 154-159, six C-2 cargo vessels for U. S. Maritime Commission. Keels laid, No. 154, August 25, 1938; No. 155, September 20, 1938; No. 156, January 3, 1939; No. 157, March 16, 1939; **launching dates, Nos. 154 and 155, May 20, 1939.**

Hulls Nos. 160 and 161, two torpedo boat destroyers for the United States Navy. Keels laid March 1, 1939.

Hulls Nos. 162-167, six C-3 cargo vessels for U. S. Maritime Commission.

Hulls Nos. 168-169, two 6000 ton cruisers for the U. S. Navy.

LEVINGSTON SHIPBUILDING CO.

Orange, Texas

NEW CONSTRUCTION:

One twin screw tunnel-type shallow draft towboat; LOA 100', beam OA 24' 8¾", depth 7' 3"; powered with two 275 H.P. Atlas diesel engines; for Asiatic Petroleum Corp., N. Y., N.Y. Delivery date August, 1939.

MANITOWOC SHIP BUILDING CO.

Manitowoc, Wis.

NEW CONSTRUCTION: **Six hopper barges** 158' x 26' x 10', capacity 800 tons, for Marine Transit Co., Chicago, Ill. Delivery date spring, 1939.

One river towboat 100' x 25' x 8', for Marine Transit Co., Chicago, Ill. Delivery date spring, 1939.

THE MARYLAND DRYDOCK CO.

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Baltimore, Maryland

NEW CONSTRUCTION:

Hull No. 194, single screw steel derrick lighter for U. S. Engineer Office, N. Y. District. LOA 115' 9⅜", LBP 110', beam overall 30' 8¾", beam molded 30', depth molded 11' 9", frame spacing throughout 21", load displacement 438 tons, mean load draft molded 9' 2½". Keel laying date October, 1938; launched December 29, 1938; **delivered April 19, 1939.**

NEWPORT NEWS SHIPBUILDING & DRYDOCK CO.

90 Broad Street, New York

NEW CONSTRUCTION:

H362, light cruiser, CL49, St. Louis, keel laid December 10, 1936; launched April 15, 1938.

Hulls Nos. 363-364, two destroyers, Nos. 413, Mustin, and 414, Russell; keels laid December, 1937; launched December 8, 1938.

Hull No. 369, twin screw mail, passenger and cargo liner for United States Lines Co.; length 723', beam 92', depth 45'. Keel laid August 22, 1938.

Hulls Nos. 370, 371 and 372, three oil tankers for Standard Oil Company of New Jersey: gross tonnage about 11,500 tons; L.B.P. 525', breadth molded 75', depth molded 39'. Keels laid, No. 370, January 16, 1939; No. 371, May 8, 1939.

Hulls Nos. 373, 374, 375 and 376, four single screw cargo vessels for United States Maritime Commission; turbine propulsion; gross tonnage about 9000 tons; length 435', breadth 63', depth 40' 6". Keels laid, No. 373, November 14, 1938; No. 374, November 28, 1938; No. 375, March 6, 1939; No. 376, May 1, 1939.

Hull No. 378, battleship, 58, Indiana, for U. S. Navy.

Hulls Nos. 379, 380, 381, 382, 383 and 384, six single screw combination passenger and cargo vessels for U. S. Maritime Commission; length 465', breadth 69' 6", depth 42' 6", gross tonnage about 8000 tons.

THE NEW YORK SHIPBUILDING CORPORATION

Camden, N. J.

NEW CONSTRUCTION:

One destroyer tender for U. S. Navy; order placed December 27, 1937.

One seaplane tender for U. S. Navy; order placed December 27, 1937.

One destroyer tender for U. S. Navy; order placed October 14, 1938.

One seaplane tender for U. S. Navy; order placed October 14, 1938.

One battleship for U. S. Navy; order placed December 1, 1938.

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Portsmouth, N. H.

NEW CONSTRUCTION:

Six submarines, Sculpin, Searaven, Seawolf, Triton and Trout.

THE PUSEY & JONES CORP.

Wilmington, Del.

NEW CONSTRUCTION:

Hull No. 1070, one steel hopper dredge, Chester Harding; 2,500 cubic yard capacity; length overall 308'2", length B.P. 300'0", breadth molded 56'0", depth molded 29'0". Contract date February 14, 1938; keel laid May 15, 1938; launched January 20, 1939; **delivery date June, 1939.**

Hull No. 1071, one steel lighthouse tender, Lilac Class, for Dept. of Commerce, Bureau of Lighthouses. Gross tonnage approximately 700 tons. Keel laid October 17, 1938; completion date July 5, 1939.

Two streamlined diesel tugs for Curtis Bay Towing Company; powered by 320 H.P. Enterprise engines; cost $200,000.

SUN SHIPBUILDING AND DRY DOCK COMPANY

Chester, Pa.

NEW CONSTRUCTION:

Hulls Nos. 175-180, six single screw diesel cargo vessels, C-2 design, for U. S. Maritime Commission; equipped with Sun-Doxford engines. Keel laying dates July 25, 1938; July 26, 1938; August 27, 1938; August 28, 1938; January 14, 1939; March 6, 1939. **Launching dates,** No. 175, April 22, 1939; **No. 176, May 18, 1939.** Delivery dates July 4, 1939; September 2, 1939; November 1, 1939; December 31, 1939; March 1, 1940, and May 1, 1940.

Hull No. 181, single screw steam turbo electric drive tanker for Atlantic Refining Co.; 521' x 70' x 40'. Keel laid November 21, 1938; delivery date September 1, 1939.

Hulls Nos. 182, 183, 184 and 185, four single screw diesel cargo vessels for U. S. Maritime Commission, C-3 design. Equipped with Busch Sulzer engines. Delivery dates November 15, 1939; December 20, 1939, January 20, 1940, and February 20, 1940.

Hulls Nos. 186-189, four C-3 single screw combination passenger and cargo vessels; diesel propelled; equipped with Sun-Doxford engines. Delivery dates October 6, 1940; December 5, 1940; February 3, 1941, and April 4, 1941.

One 16-knot tanker for Texas Co.; 13,285 tons dwt. Delivery date June, 1940.

TAMPA SHIPBUILDING & ENGINEERING CO.

P. O. Box 1838
Tampa, Fla.

NEW CONSTRUCTION:

Hulls Nos. 33-36, four C-2 type cargo vessels for U. S. Maritime Commission; 435' x 63' x 31' 6"; 9291 dwt. tons; diesel powered; cost $1,815,663 each.

DRYDOCK AND ROUTINE REPAIRS: **Sahale, Jos. R. Parrott, Gateway City, Houseboat Bottoms Up.**

Coast Survey Schedules

The Coast and Geodetic Survey of the Department of Commerce has announced its schedule of hydrographic surveys to be conducted off the West Coast of the United States during the summer of 1939. The proposed movements of the Bureau's ships which will make the surveys, together with names of commanding officers, follow:

Surveyor (R. L. Schoppe), **Pioneer** (R. D. Horne), **Guide** (D. W. Eickelberg), **Discoverer** (G. C. Jones), and the launch **Westdahl** (Benjamin H. Rigg), left Seattle, Wash., May 1, the larger ships to base on Dutch Harbor and the **Westdahl** at Hoonah.

Surveyor and **Pioneer** will resume surveys of the Aleutian Islands, started in 1934.

Guide will proceed to Western Alaska, to start a new project of original surveys beginning at Cape Sarichef, extending northwestward along the north coasts of Unimak Island and the Alaskan Peninsula, toward Bristol Bay.

Discoverer will continue the project started of extending surveys eastward along the south coast of Unimak Island and the Alaska Peninsula from Unimak Pass.

Westdahl will resume the Glacier Bay surveys started last season. It is estimated that this project will require two more seasons.

The old survey ship **Explorer** (F. H. Hardy) will begin operations about the middle of May in surveying inside waters tributary to the northern part of Puget Sound, Wash.

PACIFIC
MARINE
REVIEW

JULY, 1939

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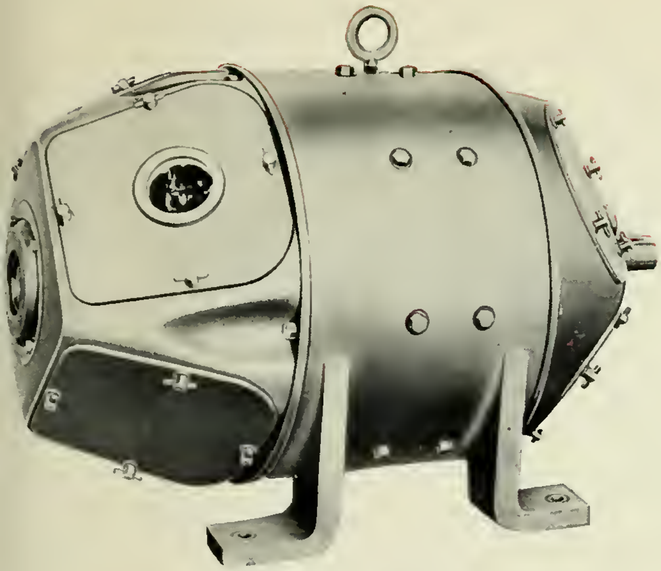

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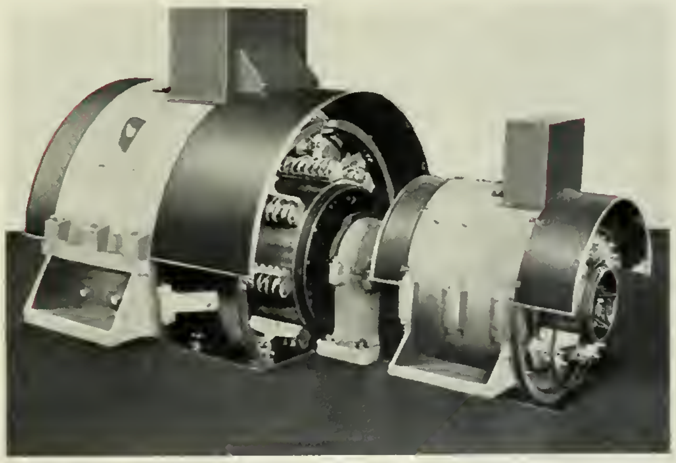

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PACIFIC MARINE REVIEW

JULY, 1939

Official Organ

Pacific American Steamship Association

Shipowners Association of the Pacific Coast

TABLE OF CONTENTS

Editorial Comment:

Nautical Training in America 19

For Sea Training—The New American Seaman 20

Your Problems Answered 24
By "The Chief."

Steady As You Go! 27
Air-Borne Damage to Sea-Borne Cargo.
VIII. Additional Advantages of Proposed Ventilation System.
By Oliver D. Colvin, Werner H. E. Hahne and Mark R. Colby.

The New Marine Steam Power Plants 30
By C. Richard Soderberg.

Commission's First C-2 Standard Cargo Vessel Powered With America's Largest Seagoing Diesel 34

San Francisco Shop Busy Building Diesel Engines for U. S. Navy Harbor Tugs 39

Modern Marine Electric Auxiliaries 42
By A. O. Loomis

From River Mud to Ocean Coral 44

A White Wanderbird Acquires Red Wings 45

The Deceleration and Acceleration of Ships 46
By D. W. Dickie

On the Ways 50
Latest News from American Shipyards.

Pacific Northwest Marine Review 52
By C. F. A. Mann.

Static Electric Hazards on Board Oil Tankers 53
By George F. Prussing.

Building in American Yards 58

Miscellaneous: Deck Officers' Licenses, 26; Engineers' Licenses, 29; An Efficient Spark Arrester Silencer, 43; American Cargo War Risk Reinsurance Exchange, 54.

PUBLISHED AT 500 SANSOME STREET . . . . SAN FRANCISCO

Entered as second class matter June 20, 1913, at the post office, San Francisco, under the Act of March 3, 1879. Published on the 1st of each month. Advertising and editorial forms close on the 15th. Subscription price, one year: Domestic, $1.50; foreign, $2.50; two years: Domestic, $2.50; foreign, $4.00; three years: Domestic, $3.00; foreign, $5.50; single copies, 25c. Chas. F. A. Mann, Northwest Representative, 1110 Puget Sound Bank Bldg., Tacoma, Washington. New York Office, Suite 404-405-406, Two Hundred Broadway, Telephone COrdlandt 7-3579.

In New York City copies of Pacific Marine Review can be purchased at the news stands of I. Goldberg, 42 Broadway; Harry Nash, 17 Battery Place; Philip Mandara, Greenwich Street and Battery Place. In Washington, D. C., at the news stand of the Carlton Hotel, 16th and K Streets.

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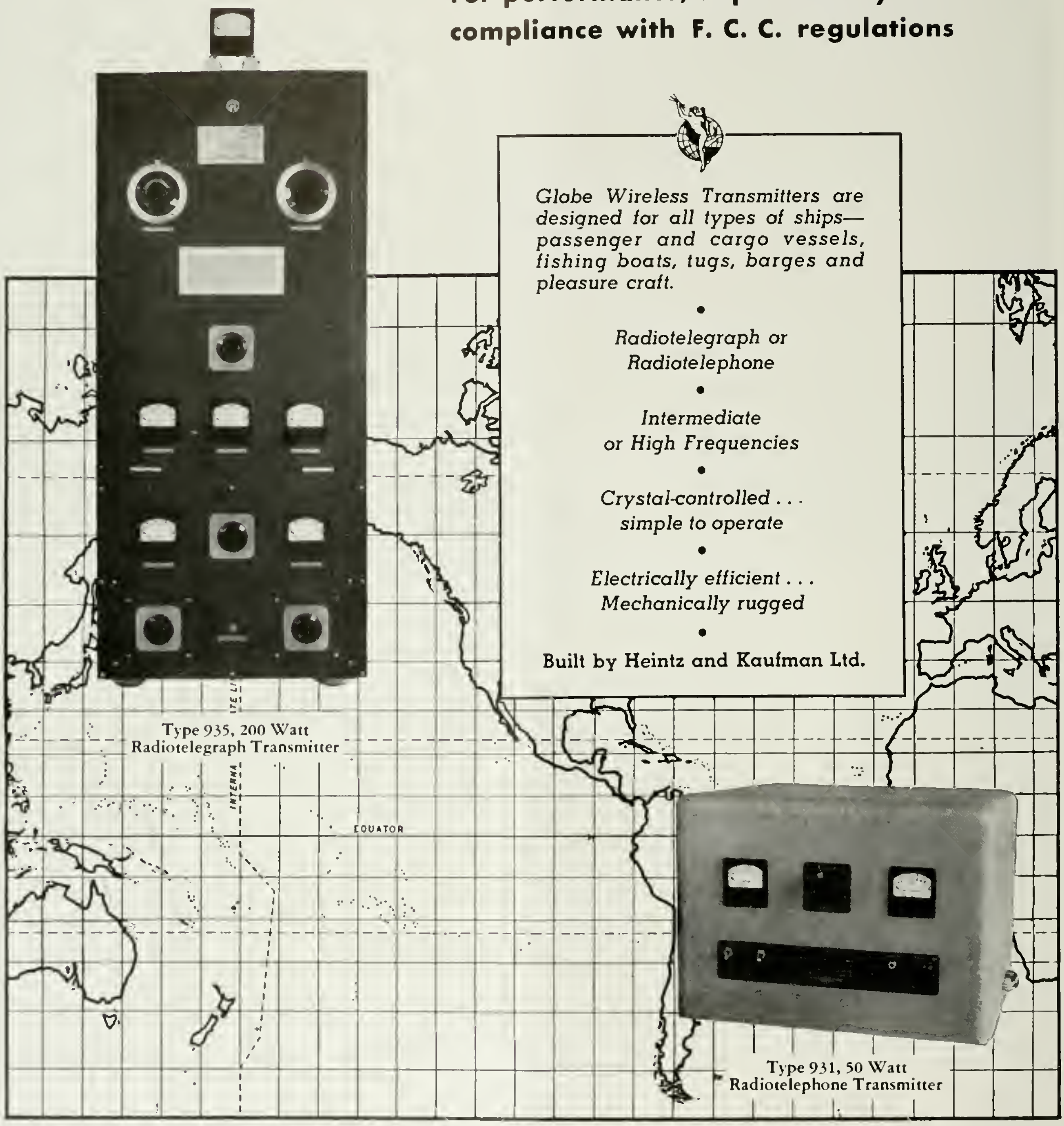

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PACIFIC MARINE REVIEW

VOLUME XXXVI JULY, 1939 NUMBER 7

Editorial Comment:

Nautical Training in America

On June 20, 1874, an act was passed by Congress authorizing the Secretary of the Navy to encourage the establishment of public nautical schools by furnishing for the use and benefit of such schools, upon request by the governor of the State, a suitable vessel properly equipped. This was first confined to any single school that might be established at any one or all of the ports of New York, Boston, Philadelphia, Baltimore, Norfolk, and San Francisco. In 1911 the act was amended to include the ports of Seattle; Detroit; Saginaw, Mich.; and Corpus Christi.

Today we have four State nautical schools functioning under this act:

(1) The New York Merchant Marine Academy, established 1875 and located at Fort Schuyler, Bronx, New York City;
(2) The Massachusetts Nautical School, established 1893 at Boston;
(3) Pennsylvania State Nautical School, established 1919 at Philadelphia; and
(4) The California Nautical School, established 1929 on San Francisco Bay.

All of these schools offer courses that are calculated to prepare young men graduates from high schools to take examination for their first licenses as commissioned officers in the merchant marine. All of them are offering both engineering and deck officer training. The first three schools offer a two-year course. California Nautical School gives a three-year course.

The response to this training effort has been very hearty. Many applicants for the course are on the waiting lists. The classes of 1938 and 1939 in the California school were practically 100 per cent sure of their future jobs prior to graduation. There were 44 graduates in 1938 and 30 more could have been placed with American steamship companies.

The expense is met partly by the State, partly by the student, partly by the Federal Government. A recent analysis of the California school shows that, roughly, the State pays 40 per cent, the student 17 per cent, and the Federal share is 43 per cent.

The tendency at present is to increase the Federal appropriations for these schools and to build new, modern ships for their use.

In July, 1938, the U. S. Maritime Commission established the U. S. Maritime Service for the exclusive purpose of training officers and seamen who are already employed in the American Merchant Marine. In this service the schools and schoolships are operated by the U. S. Coast Guard and the bills are paid by the Maritime Commission. Our leading article in this issue describes the first ship assigned to this "Service" and details the conditions under which the training is given.

These two types of nautical school are supplementary to each other. One gives preliminary training to future officers, the other maintains and augments the training of officers and presents a very effective means of training for the enlisted personnel.

Every citizen interested in shipping should throw his influence and his vote for the maintenance and the expansion of this training effort.

For Sea Training

THE NEW AMERICAN SEAMAN

U. S. Maritime Commission Places in Operation a Well-Equipped Seagoing Steamer

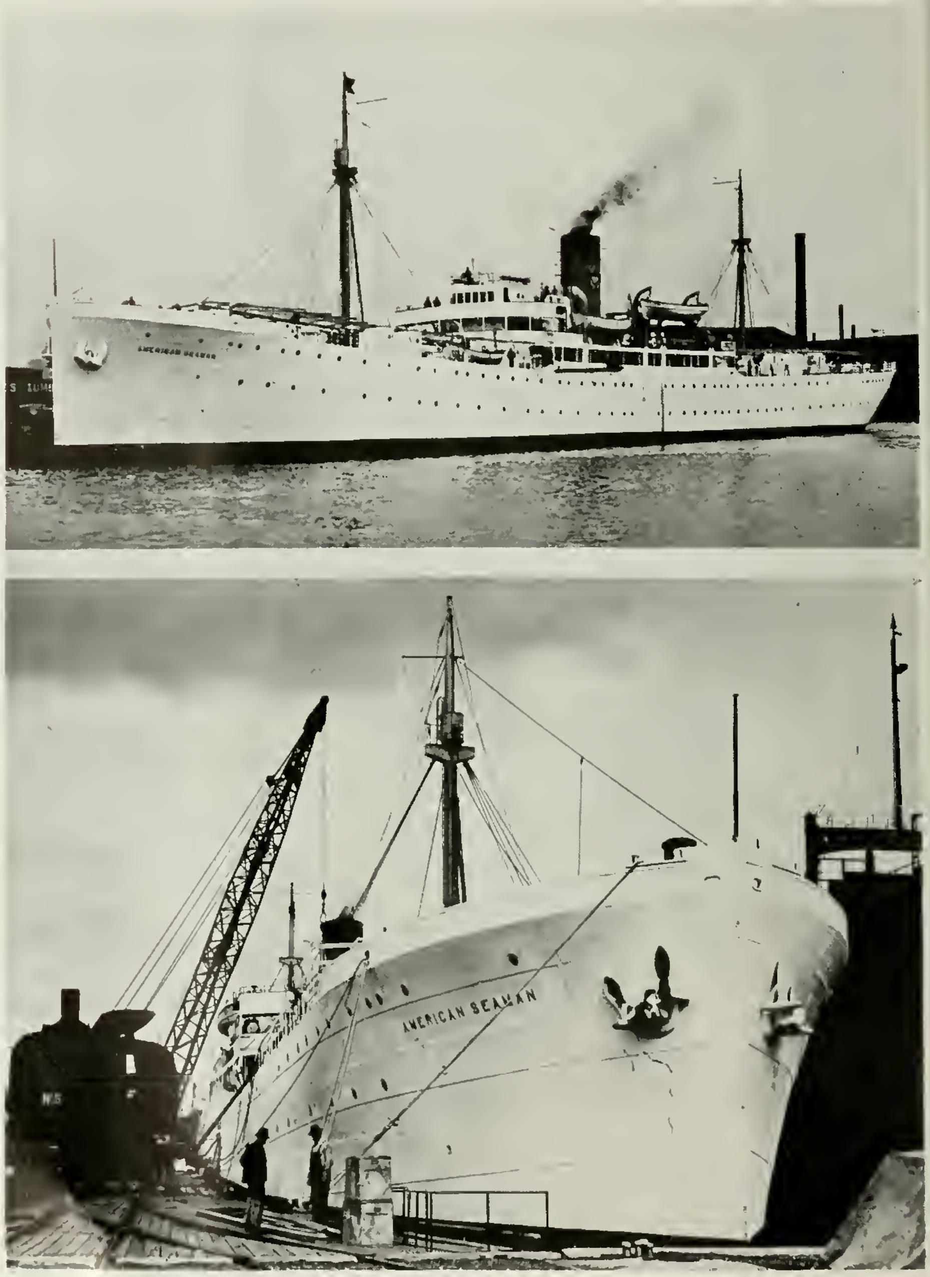
Instructed by Congress to develop and maintain a strong and efficient merchant marine, "manned with a trained and efficient citizen personnel," the United States Maritime Commission last July established the U. S. Maritime Service for the exclusive purpose of training officers and seamen for the American Marine.

An important step in this ambitious program is the completion of the steam training ship the American Seaman, for training unlicensed seamen, which was commissioned in early May. Formerly the S. S. Edgemoor, built in 1919 for the Shipping Board, and until a few years ago in regular cargo service, the ship has been completely remodeled at the Baltimore Yard of Bethlehem Steel Company. Acclaimed the best equipped training ship afloat, she is now entering upon a career which will be watched with keen hopes and anticipation by all who have American Shipping interests at heart.

The vessel is assigned to the Hoffman Island Training Station in New York Harbor and is operated for the Maritime Commission by the U. S. Coast Guard. She has accommodations for 235 men, all hands included. The regular complement will be 75 men, including officers, leaving room for about 160 trainees, as they are called. To be eligible for service, a man must be an American citizen, preferably unemployed, with at least two years' sea service in the American Merchant Marine, of which seven months must have been served within two years prior to application for enrollment.

A training course lasts three months. The men receive a salary of $36 per month in addition to quarters and subsistence. They also receive a blue serge uniform and other clothing valued at $55. Experienced and qualified men will be paid $54 monthly after two months. Free medical and dental care will be provided by officers of U. S. Public Health Service.

After successful completion of the three months' course a man becomes a member, or enrollee, of U. S. Maritime Service. Thereafter he may return to active service on the ship, at regular pay, one month a year at such time as he may select. If un-



Two views of the new sea training ship.

able to serve this time one year he may take two months the following year, or three months the third. However, three months is the maximum service at one time.

If in the meantime a man has obtained active service in the merchant marine and returns for his month of training, he will receive the regular monthly pay plus an additional retainer pay equivalent to a month's salary in his regular position. Eight months' service annually is required to qualify for retainer pay.

In addition to the annual instruction of one month, enrollees in the maritime service are entitled to regular correspondence courses in the Coast Guard Institute (of the type prepared by International Correspondence School). These courses are free and include such subjects as ocean navigation, engineering, machine-shop practice, mathematics and English.

The trainees are divided into three main groups: Deck Department, Engineering Department, Steward Department. The instructors are Coast Guard and Maritime Service men, about an equal number of each. Practically all the time of the trainees will be devoted to instruction, except for about one hour a day, which is demanded for the benefit of the ship.

Officers include a commanding officer, an executive officer, a chief engineer, and a navigation officer, all of the Coast Guard; a surgeon and a dentist, both of the Public Health Service; four licensed merchant marine deck officers and four engine officers, all of the Maritime Service; four Coast Guard warrant officers, including a chief bosun, a chief machinist, and two pay clerks; and a number of petty officers, half from the Coast Guard and half regular enrollees of the Maritime Service.

• Hull Reconditioning

Work on the vessel was started at the Baltimore Yard on September 29, 1938. The remodeling included practically every part of the ship except the hull and decks. Most of the original machinery is still in use, although thoroughly overhauled and reconditioned. The turbine was equipped with a new rotor and a number of new electric pumps were installed.

The principal characteristics of the vessel are as follows:

Length overall	423′ 9″
Length between perpendiculars	410′ 5½″
Beam molded	54′
Depth molded	37′ 9″
Draft to bottom of keel	20′ 1½″
Displacement	10,050 tons
Deadweight	9,600 tons
Propeller speed	90 r.p.m.
Speed	11 knots
Shaft horsepower	2500

Four new transverse bulkheads were built. With the seven original bulkheads this gives the vessel a total of eleven water-tight bulkheads extending to the upper deck, or sufficient divisions to make her a two-compartment ship. A longitudinal bulkhead, extending to the second deck, was built on each side of the ship except in the engine and boiler room. This provides eight storage tanks on each side, for water or ballast. Two deep tanks, aft of the engine room, formerly used for carrying water, were left unchanged; this gives a total of 18 tanks.

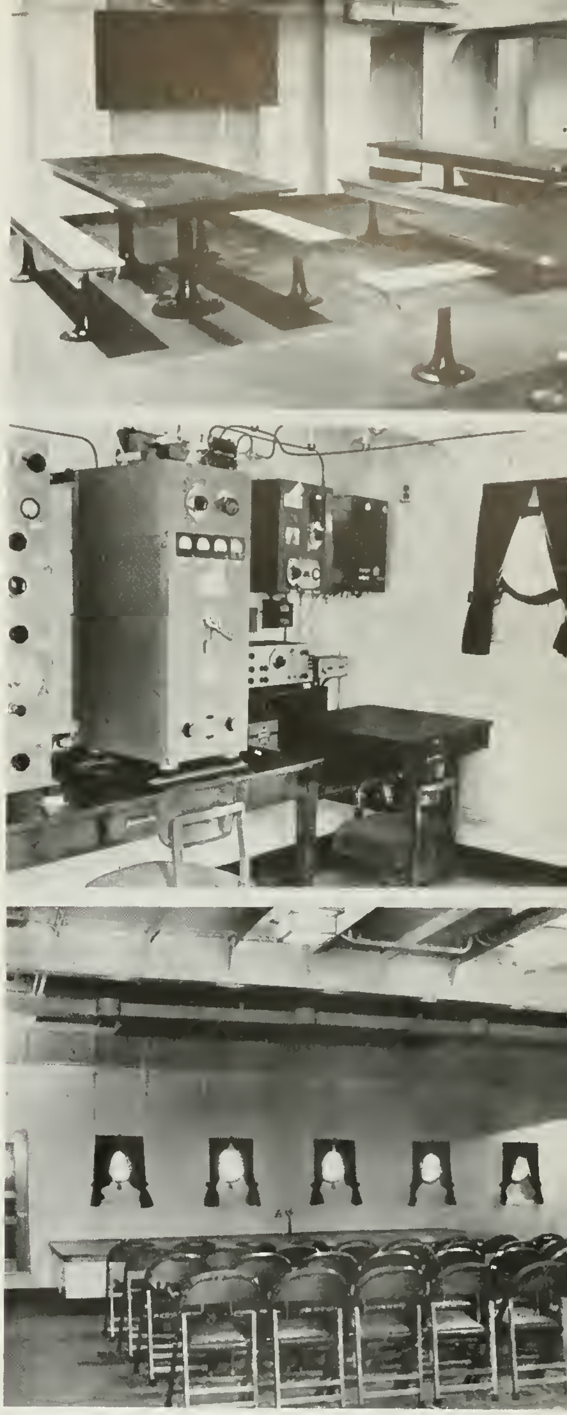
Five holds are available for stowing the ship's stores and for recreational purposes. A double bottom provides space for five fuel oil tanks and two fresh water tanks.

• Propulsion Machinery

The propulsion machinery consists of a turbine driving a four-blade propeller through double reduction gears. The turbine unit delivers 2500 shaft horsepower at a propeller speed of 90 r.p.m. and operates on 210 lb. steam, with 28 in. vacuum. Steam is generated in three Scotch boilers, equipped with soot blowers and fired with Dahl oil burners operating under natural draft. Steam reduced to 125 lb. pressure is supplied to all auxiliaries.

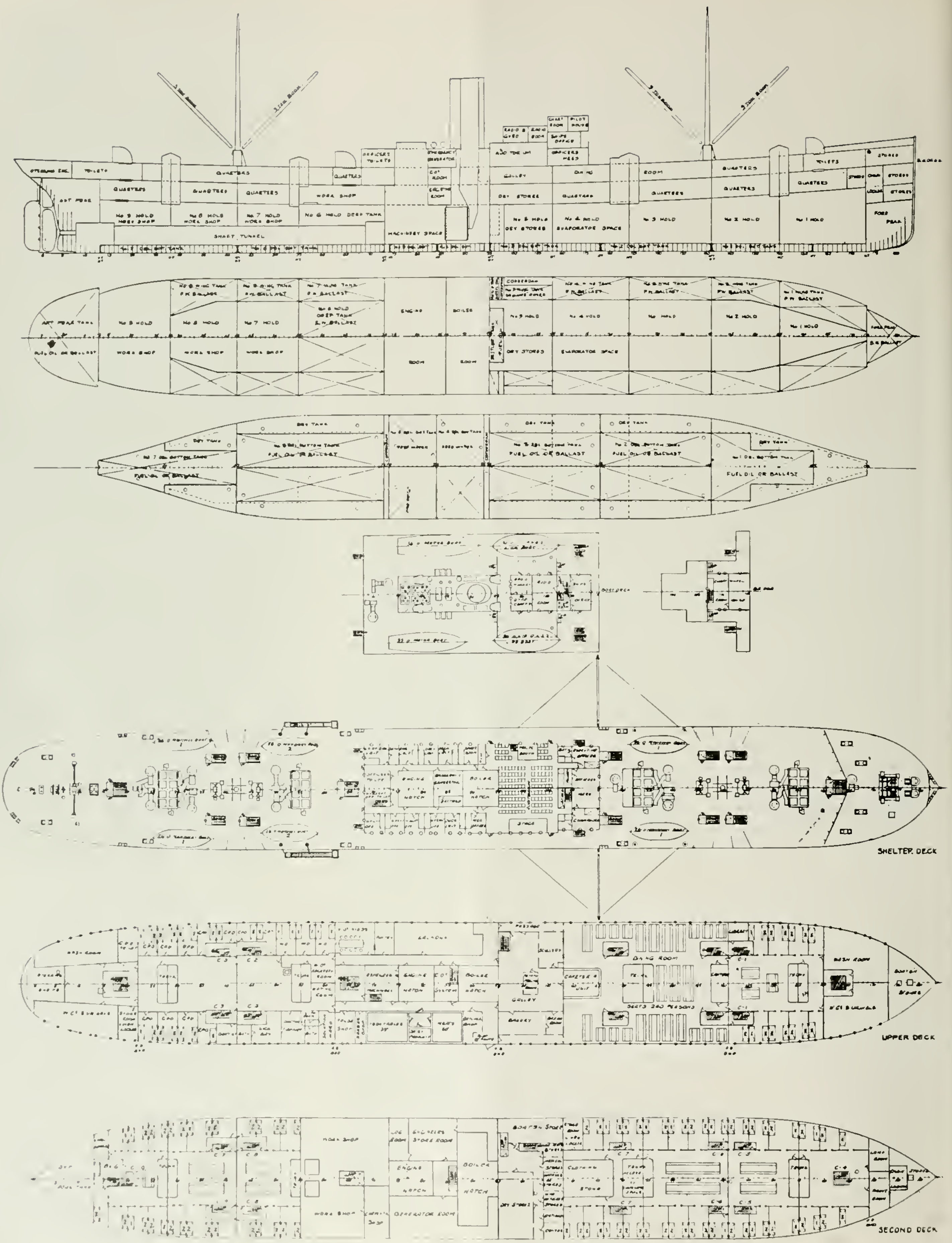
In addition to the old steam operated pumping equipment, the following new electrically driven auxiliaries have been installed: One fire pump, one sanitary pump, one bilge pump, two fresh water pumps, one diesel oil pump, one air compressor, one centrifuge for cleaning lubricating oil.

Electric power, of 240/120 volts, D.C., is furnished by two 100 kw. diesel driven generators, operated singly or in parallel with an emergency 75 kw. diesel generator on the shelter deck. In case of failure of the main diesel-generators a switch in the emergency generator room automatically transfers the temporary emergency lighting system to emergency storage batteries capable of carrying a 15 kw. load for two hours. This provides sufficient power for the lights in the fire room, engine room and all stairways and exits, until the attendant has had time to start the 75 kw. emergency generator, which in turn supplies service to the final emergency light circuit and to the emergency fire pump, bilge pump, radio and navigation equipment, and the davit motors.



Classroom, the radio room, and the auditorium on the American Seaman.

Connections are available for car-



Inboard profile and general arrangement plans of U. S. Maritime Commission training ship American Seaman.

rying the entire electrical load from shore to ship or from ship to shore.

● Navigation Equipment

The steering equipment consists of a steam driven, right-and-left screw gear controlled by hydraulic telemotor. The pilot house is equipped with: gyro-pilot automatic steering control; radio direction finder; electric sounding machine; pneumatic revolution indicator; a gyro compass with three repeaters, in addition to the three ordinary magnetic compasses; and a continuous course recorder operating in conjunction with the gyro compass. An electric rudder indicator is provided in the pilot house, with a rudder indicator recorder in the chart room. A clear vision screen facilitates steering in rough and stormy weather.

Radio communication equipment consists of three transmitters, for long, medium, and short wave, respectively, operated from the diesel generators; an emergency transmitter operated from storage batteries; two receivers covering all bands; and an automatic S.O.S. receiver giving alarm signals in wheel house, radio room, and radio operator's sleeping quarters. All radio equipment is crystal controlled. The ship is equipped with multi-coupler antenna system for broadcast receivers in all quarters and public rooms.

● Fire Protection

The entire ship is virtually fireproof, with nothing capable of burning except outside deck planking, wooden doors on bridge and in officers' quarters, stores, bedding, clothing, and miscellaneous smaller items. Standard fire hoses are provided as specified by law, with 31 outlets distributed over the ship. Fire alarm boxes and portable fire extinguishers are placed throughout all quarters. Five fireproof bulkheads insure against the spreading of a fire should it get started. The doors in these bulkheads are manually operated.

A gas flooding system has been installed for combating fire in holds, engine room, machinery space and other places required. Pipe lines are carried from thirteen points, or detector areas, to a cabinet in the pilot house. A fan is continually drawing air from these points to the cabinet which is within the sight of the officer on watch. Smoke in any area is thus immediately detected. For further safeguard the detector cabinet is equipped with a photo-electric cell, which, even with the slight trace of smoke present, activates a relay and sets off the alarm. The location of the fire is also automatically indicated.

As soon as a fire has been detected, whether by visual or audible means, the affected area is immediately flooded with carbon dioxide gas. A supply sufficient to give effective smothering in at least half of the areas at one time is stored in cylinders in a room conveniently located on the upper deck. By adjusting a three-way valve in a manifold a predetermined amount of carbon dioxide flows through the detector pipe leading to the affected area, the branch to the detector cabinet being automatically closed to prevent loss of gas.

● Accommodations

Adequate facilities are provided for efficient training of about 165 men, or trainees. All trainees have outside rooms, furnished with hanging, single metal beds which can be swung out of the way when not in use, and each man has a double locker for his wardrobe. The rooms, which accommodate two, three, or four men, are grouped around central clossrooms, or study rooms. One classroom, with adjoining rooms for 28 beds, is located on the upper deck, while six classrooms, with rooms for 154 beds, are found on the second deck.

A large auditorium, seating 150, is located on the shelter deck. This room is equipped with a stage and projection booth for sound movies and lantern slides.

Four work shops are provided, one on the second deck and three on a flat built over the shaft tunnel. These are equipped with the most modern lathes, grinders, drill presses, shapers, milling machines and an electric welding set. A small blacksmith shop and a carpenter shop are also included. Every machine in the shops has individual motor drive.

The refrigeration machinery provides 4 tons of refrigeration per 24 hours. A temperature of 20 deg. is maintained in the meat storage and 35 deg. in the dairy and in the vegetable storage. The latter is equipped with two cold diffusing fans to provide adequate air circulation around the vegetables.

Location and arrangement of officers', crew's and trainees' quarters, mess rooms, galleys and baths are clearly shown on the general arrangement plans reproduced herewith. The standards of comfort, sanitation, and cuisine are equal to the best modern standards.

All living quarters are heated with air. The air is heated with steam, in seven insulated heaters placed on the deck. It is blown through the heaters by fans and carried to the quarters through insulated sheet iron ducts. All heaters are equipped with pneumatic thermostats which actuate the steam valve. During the warm season the fans operate without the heaters. Another group of fans, independent of the first, draws air from the living quarters to maintain proper circulation. If a fire alarm is sounded from any manually operated fire alarm box all fans are automatically stopped, to prevent the possibility of supplying fresh air to a burning area. All port holes, fan intakes and outside doors are screened.

The large toilet rooms are heated directly by steam radiators. These rooms and the galley and laundry are under suction ventilation only, to prevent objectionable odors from entering the living quarters. Regular cowl ventilation is used for holds and machinery space.

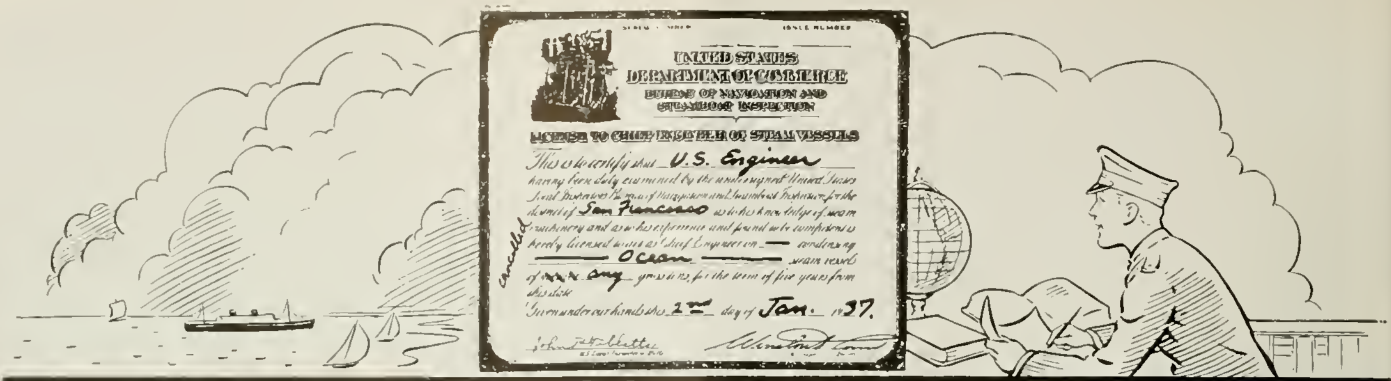
The floors in all toilets and wash rooms are of vitreous tile laid in cement. All plumbing fixtures are brass, chromium plated.

● Emergency Equipment

The lifesaving equipment consists of two 30-ft. boats, one driven by oars and one hand-propelled; and two motorboats, 35 and 36 ft., respectively. The two former are handled by mechanical davits, the latter with gravity davits. They are all raised and lowered with electrical winches. One of the motorboats is equipped with radio receiver and transmitter. A charging system is arranged to the boat location so that the batteries for the radio may be kept charged at all times. A boat boom is provided on each side of the ship.

The ship has also eight 26-ft. Monomoy boats (Coast Guard surf

(Page 29, please)


UNITED STATES
DEPARTMENT OF COMMERCE
BUREAU OF NAVIGATION AND
STEAMBOAT INSPECTION

LICENSE TO CHIEF ENGINEER OF STEAM VESSELS

This is to certify that U.S. Engineer having been duly examined by the undersigned United States Local Inspectors Bureau of Navigation and Steamboat Inspection for the district of San Francisco as to his knowledge of steam machinery and as to his experience and found to be competent is hereby licensed to act as Chief Engineer on — condensing — Ocean — steam vessels of any gross tons, for the term of five years from this date

Given under our hands this 2nd day of Jan. 1937.

Cancelled

Your Problems Answered

by "The Chief"

The word "Cancelled" was inscribed on face of the above license at the direction of the Bureau of Marine Inspection and Navigation. As used here it means "Specimen Copy."

Ball and Roller Bearings

Foreword

There is a growing tendency toward the general as well as special use of ball and roller bearings aboard ship. Furthermore, the general ideas regarding grease lubrication do not apply to this type of bearing. The use of the wrong lubricant or the correct one improperly applied leads to short life and general bearing trouble. Usually the results of wrong procedure are not apparent at once but follow much later, so that it is difficult to assign cause to effect.

Ball bearings do require special attention, but infrequently as contrasted to other bearings which are under constant observation. Thus the following points of information may be of some value to the ship's engineers. —"The Chief."

Question: What are the different kinds of so-called "anti-friction" bearings?

Answer: The usual kind is the ball bearing. Infrequently found aboard ship is the roller bearing, where rollers either tapered, cylindrical, or barrel-shaped are substituted for balls. They vary in design, depending on whether the normal load is entirely radial, partly radial, partly axial or entirely axial (thrust).

Designs also vary, depending on the manner in which the balls or rollers are inserted in the assembly.

Also designs may be had in which the outer race is curved to the surface of a sphere, thus allowing the inner race and balls to run in a path not exactly in the center plane of the outer race so that the shaft can run in a slight misalignment.

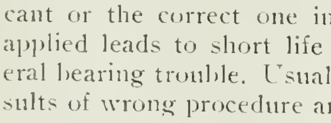


Fig. 1

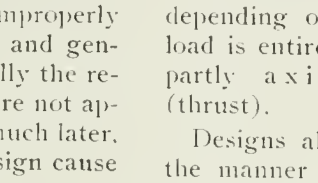


Fig. 2

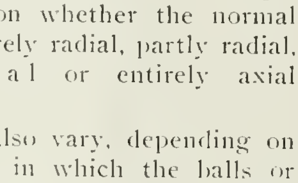


Fig. 3

Question: What is the nomenclature and numbering of ball bearings and the relative sizes?

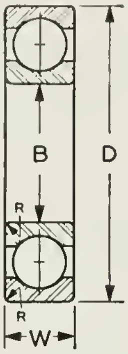
Answer: Fortunately for the industry, the manufacturers have all standardized on mounting dimensions and basic numbering so that it is possible to exchange bearings of different make.

For a given bore or diameter of fit over the shaft, there are three sizes standardized — the light duty, intermediate or medium, and the heavy duty series. These three weights of bearings are designated by the third from right hand digit of the bearing number. Thus 212 or 7212 or 5212 designates the 200 or light duty series; 312 or 7312 or 5312, the medium duty series; and 412 or 7412 or 5412, the heavy duty series. The 300 series, or medium, is the bearing in most general use.

The size of the bearing in terms of the bore and its other dimensions is indicated by the last two digits in the number. Thus sizes 204, 304 or 404 have a bore of .7874"; or 7214, 214 or 5214 a bore of 2.7559". The same bore would be found on 7314 or 314 or 5314, and also on 7414 or 414 or 5414.

Table 1 gives the list of sizes for the 300 series, with associated dimensions in millimeters and in inches. The 200 and 400 series would have the same bore but different dimensions otherwise.

The fourth and fifth digit from the right hand are numbers assigned by

BEARING NUMBER MRC	"B"-BORE M/M	"B"-BORE Inches	"B"-BORE Tolerance +.0000"	"D"-OUTSIDE DIA. M/M	"D"-OUTSIDE DIA. Inches	"D"-OUTSIDE DIA. Tolerance +.0000"	"W"-WIDTH Tolerance +.000" −.005" M/M	"W"-WIDTH Tolerance +.000" −.005" Inches	"R"* Radius Inches	Cross Section of Bearing
300-S	10	.3937	−.0003	35	1.3780	−.0005	11	.4331	.025	
301-S	12	.4724	−.0003	37	1.4567	−.0005	12	.4724	.04	
302-S	15	.5906	−.0003	42	1.6535	−.0005	13	.5118	.04	
303-S	17	.6693	−.0003	47	1.8504	−.0005	14	.5512	.04	
304-S	20	.7874	−.0004	52	2.0472	−.0006	15	.5906	.04	
305-S	25	.9843	−.0004	62	2.4409	−.0006	17	.6693	.04	
306-S	30	1.1811	−.0004	72	2.8346	−.0006	19	.7480	.04	
307-S	35	1.3780	−.0005	80	3.1496	−.0006	21	.8268	.06	
308-S	40	1.5748	−.0005	90	3.5433	−.0008	23	.9055	.06	
309-S	45	1.7717	−.0005	100	3.9370	−.0008	25	.9843	.06	
310-S	50	1.9685	−.0005	110	4.3307	−.0008	27	1.0630	.08	
311-S	55	2.1654	−.0006	120	4.7244	−.0008	29	1.1417	.08	
312-S	60	2.3622	−.0006	130	5.1181	−.0010	31	1.2205	.08	
313-S	65	2.5591	−.0006	140	5.5118	−.0010	33	1.2992	.08	
314-S	70	2.7559	−.0006	150	5.9055	−.0010	35	1.3780	.08	
315-S	75	2.9528	−.0006	160	6.2992	−.0010	37	1.4567	.08	
316-S	80	3.1496	−.0006	170	6.6929	−.0010	39	1.5354	.08	
317-S	85	3.3465	−.0008	180	7.0866	−.0010	41	1.6142	.10	
318-S	90	3.5433	−.0008	190	7.4803	−.0012	43	1.6929	.10	
319-S	95	3.7402	−.0008	200	7.8740	−.0012	45	1.7717	.10	
320-S	100	3.9370	−.0008	215	8.4646	−.0012	47	1.8504	.10	
321-S	105	4.1339	−.0008	225	8.8583	−.0012	49	1.9291	.10	
322-S	110	4.3307	−.0008	240	9.4488	−.0012	50	1.9685	.10	

*Radius "R" indicates maximum fillet radius on shaft or in housing which bearing radius will clear.

Table 1

the manufacturer to designate this particular design and application. Thus No. 1309 is SKF self-aligning type, 300 series, medium duty size 09, 1.7717" bore. Or 6309 would be SKF single row of balls not self-aligning but otherwise the same. And 7309 would be M.R.C. single row to take a thrust load, otherwise the same.

All bearings whose last three numbers are the same are interchangeable as far as dimensions are concerned, regardless of manufacture.

A letter may be added ahead of the number or after the number to mean some special design. Thus the letter S in the table of M.R.C. means "super" or extra large balls, or Strom, after the name of the inventor of the special assembly to admit the large balls. M. F. would indicate M.R.C. with special seal on one side. (See Figs. 1 and 2.) The letter M indicates a maximum capacity with the greater number of balls permitted by use of a filling notch in the races. (Fig. 3.)

This whole subject is very extensive but well covered in the manufacturers' catalogs. If readers will address "The Chief," a catalog will be mailed.

Question: What is the nature of the load carrying ability of the ball bearing?

Answer: The load is carried as a metal to metal contact between ball or roller and the race. Being a nearly perfect sphere, the contact is nearly a point with nearly zero area of contact at no load. Under moderate load the ball flattens slightly, presenting more area to carry load. The race also depresses slightly. The greatest surface loading of the ball and race is at the inner race, where its curvature is such as to present less area to the ball than the outer race.

The balls flatten just like the tire of the automobile, in which the pressure per sq. in. on the pavement is the same as the pressure in the tire, and to carry more load the tire flattens to greater load carrying area.

Question: Will ball bearings last indefinitely if properly cared for?

Answer: No, this process of deflecting and returning to normal of the ball and race for the millions of times required is the cause of the limited life of the bearing. Thus, unlike sleeve bearings, which, if properly lubricated, will last indefinitely, the ball bearing has a limited life. Application engineers usually fix the load and speed with respect to size so as to give an estimated life of approximately 100 000 hours, or over 10 years, continuous running. The life expectancy is expressed by the relationship:

$$\text{Hours life} = \frac{C}{(\text{speed}) \times (\text{load})}{}^{3}\text{, when}$$

C is a constant representing type and application.

Thus to double the speed we halve the life, or to double the load we reduce the life to 1/8 of normal. Normal final failure is a fatigue of the surface metal of ball and race, causing the metal to flake off or pit due to crystallization.

Thus spares should be carried for all ball or roller bearings, as failure is not within control of the engineer but is a matter of time just like the automobile tire.

Question: What is the purpose of lubrication if we have only a rolling friction?

Answer: Lubrication is required to prevent corrosion of the highly polished surface of the balls and races and to take care of the very light sliding friction of the balls against the ball retainer or guide which keeps them all evenly spaced. Also to keep dirt out.

Question: What precautions should be used in handling ball and roller bearings?

Answer: Absolute cleanliness is the first rule. Do not open the package containing a new bearing until ready to use it. Handle it with clean hands and tools. Do not lay it down on the floor or bench, but only on clean paper, as it picks up every particle of foreign matter it touches due to the grease in which it is packed. The can of grease for ball bearings should be used only for them and kept closed.

Question: How should ball bearings be lubricated?

Answer: In greasing ball bearings they should never be packed full of grease, as they will run hot or unduly warm. Most of the bearing heating is the churning action in the grease, some from the internal molecular friction of deflection, and some from rubbing of retainer. Too much grease is serious abuse. In greasing with a pressure cup or gun use only a little and preferably allow it to escape from another opening as it is put in at the fitting. Nearly all bearing housings have the drain or release opening at or near the bottom, which should be open when greasing. Allow the bearing to run and discharge some grease before closing the bottom drain.

Some bearings are arranged for oil lubrication, especially the very high speed units. The balls are subject to a fine spray of oil. When standing still the oil level should be at the center of the ball at the bottom.

The grease fittings should be wiped clean on gun and on bearing before using. The slightest particle of foreign matter may be the start of a rapid deterioration of the bearing.

Question: How frequently should ball bearings be greased?

Answer: Occasionally, say every two years or less, the bearing should be cleaned out to remove the old grease, which may have become contaminated or hardened. Flush it out with hot kerosene, or carbon tetrachloride, or a mixture of hot water and lube oil. Then rinse in light lube oil, assemble and regrease.

Grease should be added occasionally, say every 3 or 6 months, depending on service.

For some applications the manufacturer will now supply a double sealed bearing (sealed on each side) already greased for life, so that grease need never be added.

Most ball bearings are greased too often.

Question: What grease should be used?

Answer: Grease is a mechanical mixture of oil and soap. The soap generally used is either the **sodium** or the **lime,** sometimes called **calcium** type. Sodium soap greases are preferred due to high melting point (300° F.), do not separate oil from soap, and are slow to oxidize.

The only disadvantage of sodium soap grease is that it will mix with water. Calcium soap will not, so unless subject to water the sodium is better. A little grease in the palm of the hand with a few drops of water will quickly tell which grease it is.

A good grease has:

(a) A melt point over 300° F.
(b) A smooth, buttery texture.
(c) No dirt, abrasives or fillers.
(d) Low, free alkali content.
(e) No acid or corrosive action.
(f) No free oil or separation.
(g) A non-drying, gumming or hardening composition.

A good grease will have no odor.

The grease manufacturers all supply a grease specified for ball bearings.

Our next article will discuss the application of ball bearings.

Engineers' Licenses

The following list shows licenses granted during the month of May to engineer officers of the merchant marine at Pacific Coast offices of the Bureau of Marine Inspection and Navigation:

PORTLAND

Name and Grade	Class	Condition
David W. Crawford, 3rd Asst. Eng.	OSS, any GT	O
Martin L. Williams, Chief Eng.	OMS, any GT	RG
George E. Brallier, Chief Eng.	OMS, not over 1,000 GT	O

SAN PEDRO

Name and Grade	Class	Condition
Dale R. Holmes, Chief Eng.	OSS, any GT	RG
Fred J. Decker, 1st Asst. Eng.	OSS, any GT	RG
Fay F. Mellon, 2nd Asst. Eng.	OSS, any GT	RG

JUNEAU

Name and Grade	Class	Condition
Harry J. Winship, Chief Eng.	OSS, not over 3500 GT	RG
1st Asst. Eng.	OSS, any GT	

SAN FRANCISCO

Name and Grade	Class	Condition
George C. Cummings, Chief Eng.	OSS, any GT	O
Samuel Tabone, Chief Eng.	OSS, any GT	RG
Francis E. Jennings, Chief Eng.	OSS, any GT	RG
Paul Wulf, Chief Eng.	OSS, any GT	RG
Swan A. H. Bylander, 1st Asst. Eng.	OSS, any GT	O
Leo H. Wallace, 1st Asst. Eng.	OSS, any GT	RG
Claude G. Goings, 1st Asst. Eng.	OSS, any GT	RG
Leonard L. Lipke, 1st Asst. Eng.	OSS, any GT	RG
Frank J. Giza, 2nd Asst. Eng.	OSS, any GT	O
Addison S. Kirk, 2nd Asst. Eng.	OSS, any GT	O
Gerald L. Jones, 2nd Asst. Eng.	OSS, any GT	RG
John U. Kreitler, 2nd Asst. Eng.	OSS, any GT	RG
Reynold Homme, 2nd Asst. Eng.	OSS, any GT	RG
Elton R. Lipp, 2nd Asst. Eng.	OSS, any GT	RG
Knud E. Schmehl, 3rd Asst. Eng.	OSS, any GT	O
Louis Sancken, Chief Eng.	OMS, any GT	RG
Henry S. Johnson, 2nd Asst. Eng.	OMS, any GT	RG

Abbreviations: GT is gross tonnage; RG is raised grade; O is original license; OSS is ocean steamer; OMS is ocean motorship

NEW FIRST AID KIT

Kanister Kit is the name of a new first aid unit just introduced by B. F. McDonald Company, Los Angeles. It is a cylinder made of drawn aluminum, with a thumb and finger release providing instantaneous access to a canvas roll-up contained inside. The roll-up carries essential first aid material in a convenient series of pockets and may be hung over the forearm to allow free use of both hands for treatment.

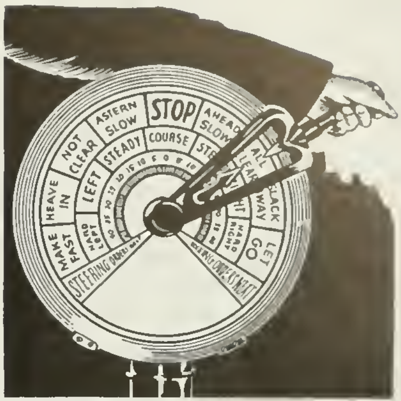
The Kanister Kit attaches to a wall-bracket which may be mounted anywhere. It is intended primarily for "danger spots" in shop, yard, field, or mine areas where workmen are too far removed from regular first aid stations. It is easily serviced, and is claimed to be rust-proof, dust-proof and corrosion-proof. Roll-ups are fitted with standard first aid assortments or to special specifications. A bulletin describing and picturing Kanister Kits in detail may be obtained by writing this magazine.

WORTHINGTON PROMOTES WORKS EXECUTIVES

L. C. Rickets, a member of the Worthington organization for the past ten years, and recently general superintendent of the corporation's Harrison Works, has been appointed manager of that works. **W. D. Sizer,** who joined Worthington in 1920, is appointed executive engineer in charge of all engineering activities at Harrison. **B. R. McBath** now assumes full responsibility as engineer in charge of the centrifugal engineering division, succeeding Mr. Sizer.

Steady as you go!

KNOWLEDGE IS THE STRAIGHT COURSE TO ADVANCEMENT



A DEPARTMENT FOR DECK OFFICERS

AIR-BORNE DAMAGE TO SEA-BORNE CARGO

VIII ADDITIONAL ADVANTAGES OF PROPOSED VENTILATION SYSTEM

By OLIVER D. COLVIN, WERNER H. E. HAHNE and MARK R. COLBY

Once a ship has blowers and a duct system for the primary purpose of protecting the cargo against moisture damage, it is apparent to the seagoing man and the naval architect that they have a tool at hand which can be turned at practically no cost to the elimination or reduction of the remaining cargo damage risks such as fire, vermin, or fumigation.

(1) Fire Detection. In view of the fact that the temperature in each cargo space is logged regularly, the new ventilating system is a fire alarm. Any unexpected rise in the temperature of a hold will indicate the heating of cargo and the development of a fire. It should be obvious that, by circulation of air, a hot spot in the cargo is detected much more quickly than by still or practically still air found in the cargo holds today.

One of the approved fire alarm systems can also be connected to the duct system.

(2) Fire Fighting. This new ventilating system can easily be connected to one of the approved fire-fighting systems on the market today, with a very good chance of improving the latter's effective performance. Small-scale experiments have proved this in the case of carbon dioxide, an excellent fire suffocant when properly dispersed.

(a) Fighting Fires with Carbon Dioxide and Other Inert Gases. In the first part of this paper we explained the theory of fire and of extinguishing fires. Extinguishing fires with water, either by hose or by flooding the holds, frequently causes more damage to the ship and cargo than the fire itself. Steam has proved to be completely inefficient, for the reason that it condenses in the hold instead of suffocating the fire.

Carbon dioxide is becoming an accepted agent for smothering fires and has proved its value in many instances. One disadvantage is its high specific gravity. It is more than 50 per cent heavier than air of the same temperature and tends to plunge down to the lower zones of the cargo spaces without mixing with the air in the hold. This has been proved by observations on ships as well as in many small-scale experiments. Now, a supply of gas in cylinders is heavy and bulky. The authorities, therefore, require a ship to carry only enough carbon dioxide—namely, one pound of gas for every 27 cubic feet of space—for the treatment of the largest space between watertight bulkheads from tank top to weather deck, plus a certain percentage as safety factor. This means that not even the lower hold could be filled with concentrated carbon dioxide, let alone the 'tween decks. There is, of course, a certain degree of mixing going on during the period of gas injection, and later on by slow diffusion. Both are unsatisfactory, as indicated by a recent case in which oil-cake had caught fire. In spite of the use of 10 extra cylinders, the fire could not be extinguished. It was finally found to be underneath the deck where the CO_2 did not rise, and it was then extinguished by water from a hose.

It has been proposed in England that the carbon dioxide be heated before being injected into the cargo space. This would bring the specific gravity of the gas to near or above that of the air. A patent has been issued on such a system in England, but it is not known whether it has been introduced successfully. Usual experience indicates that even gases of the same specific gravity as that of air do not mix quickly enough by diffusion in order to be of great value in fighting fires quickly.

(2) Mechanical Mixing Improves Performance. The logical and quickest method of mixing two gases of different specific gravity is by mechanical stirring. This can very readily be accomplished with the ventilation system above described. Once the carbon dioxide is injected into the cargo hold that is on fire, the fans are started and the air and gas are recirculated internally. Small-scale experiments indicate that both gases will be mixed thoroughly within a few minutes. Once the two gases are mixed, at the ratio of one pound of CO_2 for each 27 cubic feet of cargo space, the mixture is suffocating and will extinguish a fire in any location and at any height in the cargo hold. There is no harm in running the fans with such suffocating gas in the hold. On the contrary, this will be an added valuable feature of the new ventilating system.

(3) Cooling Cargo Prevents Rekindling of Fires. In the beginning of the paper we had pointed out the two methods of fighting fires and stated that both methods must have for their ultimate result the cooling of the burning matter below its point of ignition. This phase has been neglected, it appears. There are numerous cases on record which show that a fire, after being arrested, was likely to burst into open flames again many days and even weeks after the carbon dioxide had been applied. The fire was arrested immediately, as evidenced by gradually falling temperatures, but the temperature of the burning parcels was above the point of ignition.

Now, a great mass of cargo stowed on all sides of a burning parcel is much like a heat insulating blanket, which permits the hot parcel to cool off only very slowly. We have made a few tentative calculations on the burning of a bale of cotton, which indicate that it would take more than 100 hours to cool the center of the bale below the kindling point. This explanation seems to be more logical than the customary one, which claims that the air trapped in the cargo sustains combustion for such a long time. The most loosely packed cotton bale contains oxygen in its interstices, which cannot burn more than about one pound of cotton; and one pound of cotton produces about 7600 B.t.u., which could heat about 40 pounds of cotton above its kindling point. It appears that such small quantities of air could not support a smothering fire for a number of weeks, provided of course that no additional oxygen comes in contact with the burning matter.

Now the cooling action of a charge of carbon dioxide is very small, as was illustrated under the section "Cold Bulkheads." The only way of cooling a heated mass of cargo without aiding combustion and without applying water is by circulating cool inert gas through and over the heated parcels. This can be accomplished, excellently, with the air recirculating system described above. The air and carbon dioxide mixture is circulated through the cargo with the result that the heated air is passed to the cool sides and decks of the ship, whence it is returned to the heated parcels. It is reasonable to suppose that a heated parcel buried in a block of cargo can be cooled by this method below its temperature of ignition within a much briefer period than has been heretofore possible. Absolute proof awaits large-scale experiments.

(3) Fumigation and Purging. Another important application is to the fumigation and the purging of holds after fumigation. It was shown in the early part of this paper that intimate contact between gas and vermin is necessary for an efficient kill and also that the quick and complete removal of the fumigant means saving of time and possibly prevention of personal injury. There can be no doubt that a ventilating system of the type described will materially improve the overall efficiency of fumigating a hold.

Summary and Conclusion

With the exception of fire and vermin, nearly all damage is directly traceable to moisture in the cargo hold coming from either the outside atmosphere or from the hygroscopic nature of the cargo and materials in the hold. This leads to the conclusion that humidity control with ventilation is the important goal to seek to prevent by far the major portion of damage to cargo.

In the search for the best economic method of accomplishing this aim, the facts gradually marshalled point to the necessity for an efficient duct system in the hold capable of recirculating the air to which is connected a supply of air of very low moisture content supplied by an absorption dehumidifier. From the very practical seagoing reasons of performance, weight, space, cost and maintenance of watertight integrity, this method seems to stand pre-eminent.

Such a duct and blower system using less than ½ of 1 per cent of the cargo capacity, measured either in weight or cubic measurement, could very easily be used to aid in the detection and fighting of fires, in the removal of tainting or staining gases or smoke and in the efficient fumigation and after-purging of cargo holds.

Very real benefits would follow the adoption of a scheme of this sort. The shipper himself, who owns the manufactured goods or raw commodities, should be intensely interested. He is not satisfied to get insurance some months later for damage done to his goods. He is interested in getting goods to market in salable condition ahead of competition. The shipowner also is interested to keep his cost down. The cost of such an installation has been estimated to be less than the freight revenue from 10 to 25 tons of cargo per voyage. With protection guaranteed to the shipper, it should be easy for ships to attract trade now lost to other forms of transportation, which trend has been increasing in recent years.

The shipbuilder, naval architect and the marine engineer have vital interests at stake. Anything which can improve the art of shipbuilding and which can make the carriage of goods by sea more certain, reliable and at the same time less expensive cannot help but improve the outlook for a healthy merchant marine. Such a fleet of ships should be more self-sustaining, which would reflect favorable comment from the taxpayer, and from the exporter and importer who may hope to ship his goods by American lines. Such a fleet builds up a reserve of ships on which the country would of necessity have to lean heavily in wartime.

We must not forget the underwriters who at the present time consider "Sweat Damage" insurance to be, frankly, a "headache" and endure it to get the general coverage.

The subject is fairly new and much remains to be done toward pefecting both theory and practice. There is no doubt that adaptations of this duct system and dehumidification scheme will appear obvious to many ship operators. It is our hope that these studies will result in "taking the guesswork out of care of cargo in ships' holds."

The American Seaman

(Continued from page 23)

boats). Two of these are handled with the old, round, swinging type davits; the other six are stowed on deck and handled with the ship's boom.

For general alarm 8-in. bells are provided in all sleeping quarters. These are operated by storage batteries and are manually controlled. Three individual intercommunicating telephone systems have been installed, one for general navigation service, one for the engine department, and one for messenger service.

By careful selection and proper spacing of the fixtures, a lighting system was worked out that gives an even, well diffused light, free from glare and shadows. Four floodlights are installed on the boat deck, one at each corner. These can be swung around to light up the deck or the lifeboats at night.

The ship is painted according to the regular Coast Guard color scheme, white hull and generally white interior. The stack is new and has the Maritime Service insignia. Awnings are available for covering practically the entire shelter deck, fore and aft of the deckhouse.

The ship has two booms on each mast and four cargo winches. A side port is fitted for entering stores and supplies, including oil and water. Connection for shore power is also made at this point.

An evaporation or distilling plant of two units with a combined daily capacity of 80,000 gals., for the conversion of sea water into fresh water, has been installed to make the vessel serviceable for national defense purposes.

Tank space is provided for 192 tons of boiler feed water, 160 tons of drinking water, and 2974 tons of fresh water ballast. The vessel can also carry 1062 tons of oil for the boilers and 35 tons of diesel oil.

Deck Officers' Licenses

The following list shows licenses granted during the month of May to deck officers of the merchant marine at Pacific Coast offices of the Bureau of Marine Inspection and Navigation:

Name and Grade	Class	Condition
PORTLAND		
William C. Ash, Master	OSS, any GT	RG
Raymond C. Gosson, Master	OSS, any GT	RG
Harold J. Theriault, Chief Mate	OSS, any GT	RG
SAN PEDRO		
Benjamin Alexander, Master	OSS, 20,000 GT	RG
Henry Angelsen, 2nd Mate	OSS, any GT	O
John G. Palmer, 3rd Mate	OSS, any GT	O
Maurice V. Ring, 2nd Mate	OSS, any GT	O
Carroll J. Robertson, 3rd Mate	OSS, any GT	O
SEATTLE		
Bill W. Henshaw, 2nd Mate and Pilot	OSS, any GT	RG
John Robinson, 3rd Mate	OSS, any GT	O
SAN FRANCISCO		
Bennett M. Dodson, Master	OSS, any GT	RG
Charles L. Neill, Master	OSS, any GT	RG
Cecil F. Crawford, Master	OSS, any GT	RG
Perry McPheeters, Chief Mate	OSS, any GT	RG
Edwin C. Miller, Chief Mate	OSS, any GT	RG
Martin Bramman, Chief Mate	OSS, any GT	RG
John W. Keenan, 2nd Mate	OSS, any GT	O
John E. Haukom, 2nd Mate	OSS, any GT	RG
Walter E. Brunsch, 2nd Mate	OSS, any GT	RG
Malcolm A. Gompertz, 2nd Mate	OSS, any GT	RG
John R. Sarrins, 2nd Mate	OSS, any GT	RG
Dalmon P. Tucker, 3rd Mate	OSS, any GT	O
Walter C. Wiechert, 3rd Mate	OSS, any GT	O

Abbreviations: GT is gross tonnage; RG is raised grade; O is original license; OSS is ocean steamer; OMS is ocean motorship.

FISHERIES OF THE PACIFIC COAST STATES

The commercial catch of fishery products in the Pacific Coast States in 1937 amounted to 1,576,877,000 pounds, valued at $28,776,000, according to the Bureau of Fisheries, Department of Commerce.

This is a decrease of 18 per cent in volume but an increase of 16 per cent in value as compared with the catch in the preceding year.

Based on the value to the fishermen, tuna and tuna-like fishes were the most important product, amounting to 162,648,000 pounds, valued at $9,074,000. Following in order were pilchard or sardine, 1,139,505,000 pounds, valued at $6,815,000; salmon, 95,661,000 pounds, valued at $5,427,000; halibut, 24,418,000 pounds, valued at $2,177,000; oysters, 8,240,000 pounds of meats, valued at $788,000; flounders, 16,285,000 pounds, valued at $749,000; and crabs, 8,356,000 pounds, valued at $721,000, statistics show.

The catch in Washington amounted to 155,805,000 pounds, valued at $7,222,000; Oregon, 68,945,000 pounds, valued at $2,609,000; and California, 1,352,127,000 pounds, valued at $18,945,000.

These fisheries gave employment to 41,600 persons in 1937. They consisted of 21,600 fishermen, 19,800 persons in wholesale and manufacturing establishments, and 200 on transporting craft. There were 37,400 persons employed in these fisheries in 1936.

In 1937 there were 330 fishery wholesale and manufacturing establishments in the three States; aggregate salaries and wages paid in such establishments amounted to $10,669,000.

In 1936 there were 339 fishery wholesale and manufacturing establishments; aggregate salaries and wages amounted to $9,365,000; and manufactured fishery products were valued at $52,498,000.

The New
MARINE STEAM POWER PLANTS

Some Problems Incidental to the Use of High Pressures and High Temperatures

By C. RICHARD SODERBERG
Professor of Applied Mechanics, Massachusetts Institute of Technology

The fundamental premise of this paper is that the advance toward higher operating economy through increases in thermal efficiency will go on. The object of this paper is to present a review of some of the problems of mechanical engineering which must be solved in order to reduce to a minimum the difficulties of this development.

The incentive for advances in steam conditions are reduced fuel consumption and reduced weight of the propelling machinery. These considerations are interrelated in the sense that the reduction in weight is principally a result of the reduced volume as well as mass of the steam flow.

Ideal Efficiency

The limit of efficiency for a thermal cycle, operating with an idealized medium between the extremes in absolute temperatures T_1 and T_2 is $1 - T_2/T_1$. For the limits of temperature now in common use in marine power plants, $T_1 = 750 + 460 = 1210$ degrees F. and $T_2 = 90 + 460 = 550$ degrees F., this efficiency is 0.545, considerably beyond that of actual plants. In the temperature range of interest this efficiency increases by about 1 per cent for each 18 degrees F. advance in temperature.

The main aspects of the actual thermal cycles in use are determined principally by the characteristics of water vapor. These cycles are such that an increase in temperature alone does not bring about much improvement of efficiency; it is only when both pressure and temperature are increased that an appreciable gain in efficiency is realized. Moreover, because of the presence of moisture in the exhaust blading, there is a restriction of the choice of pressure which can be used in combination with a certain temperature.

When a certain limit in maximum steam temperature has been established, it is possible to construct a thermal cycle of optimum efficiency. This cycle represents a compromise of technical and economical considerations. The means available to us for enhancing this optimum efficiency in steam cycles are **reheating** and **regenerative feed heating**. Assuming a present practical limit in maximum temperature of 900 or 950 degrees F., it is questionable whether reheating will prove an economical possibility. This leaves us with the regenerative feed heating cycle as the most promising approach to higher operating economy. The number of extraction points becomes an economic problem, the solution of which will depend on the conditions of each individual application.

The choice of inlet pressure depends upon the permissible exhaust moisture, the steam flow through its influence upon the efficiency of the first stages, and a variety of economical considerations. Under present premises, the very high pressures can probably be justified only for the largest capacities.

Table 1 gives a comparison of ideal efficiencies for a series of plant conditions. These efficiencies are based on zero losses throughout the cycle. The extraction points for feed heating have been placed so as to divide the enthalpy drop in equal parts. On this basis there is a possible fuel saving of about 25 per cent between 400 pounds per square inch, gage, 700 degrees F., and 2400 pounds per square inch, 950 degrees F. The actual saving will probably be somewhat less, but the above figures give a good indication of the incentive for advancing the steam conditions.

The applicability of any one of these plants to a given case depends principally upon the moisture content in the exhaust. With present means of erosion protection and

TABLE 1.—IDEAL EFFICIENCIES; 28½ INCHES VACUUM

Plant	*A*	*B*	*C*	*D*	*E*	*F*
Pressure, pounds per square inch, gage	400	600	800	1200	1800	2400
Temperature, degrees F.	700	750	850	900	950	950
Carnot efficiency, $1 - T_2/T_1$	0.525	0.544	0.579	0.594	0.609	0.609
Ideal efficiency, straight condensing	0.355	0.375	0.394	0.412	0.430	0.438
Feed heating						
In stages	2	2	3	3	4	5
To temperature, degrees F.	320	349	406	441	507	570
Ideal efficiency	0.383	0.409	0.428	0.461	0.500	0.510
Saving, per cent	0	6.4	10.5	17.0	23.3	25.0
Exhaust moisture, per cent						
Turbine efficiency, 70 per cent	6.0	6.6	4.9	5.6	6.6	8.9
Turbine efficiency, 75 per cent	8.2	9.0	7.4	8.3	9.5	11.8
Turbine efficiency, 80 per cent	10.4	11.3	10.1	11.1	12.4	14.6

moisture removal of the last row blades, this moisture content probably can be raised beyond the limit of 12 per cent, which has become conventional on land installations. Due to the lower turbine efficiencies, and the poorer vacua, it is probable that marine installations on this basis may justify relatively higher operating pressures than land installations.

The information of the last three lines of Table 1 has been prepared to illustrate this condition. The moisture content is a practically linear function of the internal efficiency of the turbine, so that other values may be obtained by straight-line interpolation.

The fuel rates that can be obtained for any one of these plants depend on the details of the plant and the requirements of auxiliary power. With a fuel of 18,500 British thermal units per pound, and a drive of the approximate size of 10,000 horsepower, it would not be unreasonable to predict a fuel rate of 0.60 pound per horsepower per hour for plant A, and 0.47 pound per horsepower per hour for plant F, indicating a possible saving of plant F over plant A of 21.7 per cent.

● Probable Direction of Developments

The watertube type of marine boiler has by now reached a very high degree of development and there is every reason to believe that the existing types will satisfactorily take care of the advance toward the limit in temperature, which is permitted by present materials. As already indicated, this limit is probably about 950 degrees F. However, if the steam pressures are to advance materially beyond 1200 pounds per square inch, and the gains in efficiency and weight make such an advance likely, the forced-circulation type of boiler becomes an almost inevitable part of the development.

The next question of vital importance concerns the choice of thermal cycle. If re-heating is regarded as an economical possibility, the choice of operating pressures is considerably widened, and valuable improvements in efficiency may be made without going to the extremes of steam temperatures. This question has been given very careful study over many years on land stations, and the verdict here appears to be in favor of the non-reheating type of plant. Where reheat is considered at all, it is almost without exception a question of boiler reheat. The pressure losses and operating difficulties which have characterized steam reheaters appear to make them much less desirable. It is possible to conclude from this that the decisions on marine power plants will be preponderantly in favor of the non-reheat type of plant. However, the essential factors which decide whether or not reheat should be used are economical, and open to a variety of interpretations, so that reheating will probably be tried in a few installations.

The choice of the number of feed-heating stages, and their combination with economizers and air preheaters, is likewise an economical question. The summary given in Table I is an attempt at a guess at the economical optimum of the number of feed-heating stages. Again, the principal factors are open to many interpretations and it is likely that the practice in this respect will show wide variations.

The introduction of the forced-circulation type of boiler might possibly bring about a fundamentally different solution of the question of feed heating as well as reheating. The rigid separation between boiler plant and turbine plant, which is characteristic of existing designs for both land and marine installations, is undoubtedly a relic from the steam plants of the last century. To combine them both into one assembly appears visionary at the present time, but some day this solution is bound to appear. Land developments already show tendencies in this direction. If this possibility should reach practical realization, many of the restrictions of reheating and feed heating will disappear. At present, however, it appears safe to relegate this possibility into the background along with other visionary schemes.

The influence of advances in steam conditions upon the turbine and the power transmission to the propeller shaft is indicated by developments which have already taken place. The speeds of rotation will advance to a vaguely defined optimum, which certainly will require double-reduction gears for most installations. The number of cylinders per expansion will probably not exceed three, except for some of the super-pressure installations.

The question of electric drive or gears is outside of the scope of this paper. For conditions of maneuvering which go far beyond the ordinary run of circumstances, the electric drive may be essential. The experience gained with geared turbines in large powers on destroyers and cruisers indicates, however, that for those conditions the problem of maneuvering and astern operation can be solved successfully with geared turbines. For practically all types of ships, therefore, which come under the scope of this paper, the choice between electric drive or gears must be made on the basis of economics.

● Mechanical Properties of Metals at High Temperatures

Creep. Up to a few years ago the problem of mechanical strength of engineering structures was viewed entirely from the point of view of strength in the elastic sense. The constructions were based upon the assumption that the elastic range of stress would not be exceeded, at least not intentionally. The plastic range of stress was of interest chiefly as one of the many qualitative means of judging the metallurgical properties of the materials.

The most important advances on the subject of mechanical strength relate to the growing conviction that the non-elastic properties of our materials are really much more important than the elastic properties, and much more significant in relation to failure. This is particularly true at elevated temperatures. The problem of **creep** has been singled out as the most important of these non-elastic properties, and a review of its major aspects is certainly justified in the present connection.

Our principal source of information on this property is the tensile creep test, in which a tensile test specimen is kept at constant stress and constant temperature, the elongation being recorded as a function of time. At the beginning of the test the deformation increases very rapidly; the rate of deformation then

TABLE 2. -INFORMATION ON CREEP

Material	Minimum creep rate			Increments required to double creep rate	
	At stress, lb in^2	At temp., °F.	$\varepsilon \infty$ 1 h. 10^6	In stress, lb in^2	In temp., °F.
Forged 0.35C steel	7500	850	0.7	1200	25 to 18
Cast 0.35C steel	7500	850	0.1	1700	25 to 20
Cast 0.35C–0.4 Mo steel	7500	950	0.3	2400	30 to 25

falls until, after a few months, it reaches a steady value. This steady state appears to be possible, however, only for moderate stress. For very high stresses the rate of deformation reaches a minimum value, but this condition cannot be sustained; the rate keeps on increasing until fracture occurs.

The plastic deformation is usually regarded as synonymous with the permanent deformation, which remains after the load has been taken off. This is true the instant the load is removed, but if the specimen is left at temperature without load, it will contract gradually with time so that a part of the plastic deformation is recovered. This phenomenon is called **elastic after-effect** or **creep-recovery**. The elastic after-effect is usually not large and may often be ignored for practical purposes.

The enormous amount of creep testing which has been done during the last decade by various research institutions and commercial firms has had for its principal object the determination of this creep rate for various operating conditions of different materials.

For most of the steels of interest in the present connection this creep rate depends approximately upon stress and temperature in such a manner that **an arithmetical increment in stress or temperature brings about a geometrical increment in creep rate**. This law makes it possible to determine the increments in stress and temperature which are required to double the creep rate.

Table 2 shows a set of values of the creep rate at a certain stress and temperature, as well as the values of these increments, for three steels of interest. It should be noted that these figures are very approximate and may not always be duplicated by a new test. This applies particularly to the creep rate, but also, although to a lesser extent, to the increments. To take a specific example, assume that cast carbon steel has given satisfactory performance at a stress of 7500 pounds per square inch and a temperature of 850 degrees F. The creep rate of Table 2 corresponding to these conditions is 1 per cent in 100,000 hours. If the temperament were advanced to 950 degrees F. the creep rate would double approximately five times; that is, it would be $2^5 = 32$ times as large, or 32 per cent in 100,000 hours. This might well be disastrous. To compensate for this by a decrease in stress would require enormous increases of wall thicknesses.

One of the most important aspects of the problem, therefore, is the extremely rapid increase of creep rates with increases of temperature and stress which characterize all of our materials. Successful operation at a certain temperature does not ordinarily give assurance that an increase of 50 degrees F. in the operating temperature is permissible without a major rearrangement of the design. The premises of design of most of the essential elements of power plant equipment are such, on the other hand, that a fundamental departure from certain proportions may bring in new, equally serious problems. For example, the known aspects of the creep problem may in a certain case indicate the desirability of increasing the wall thickness of a turbine cylinder. Such a change is almost certain to cause greater temperature gradients and distortions due to thermal expansion. In many instances it is entirely possible that less risk might be involved in permitting increases of the creep rates.

This situation makes it imperative that advances in inlet steam conditions be based upon the development of new materials. Very important progress in this direction has been made in recent years, and the problem is being studied in many institutions the world over. The addition of molybdenum is probably the most important single item in this development, so that 0.35C 0.5Mo steels have already become common in such structures as turbine cylinders, valve bodies, and piping. As indicated by Table 2, the cast C-Mo steel at 900 degrees F. may be expected to compare favorably with cast C steel at 850 degrees F. This is of course a rough rule which may not hold for all types of steels, but in general it can be said that the introduction of molybdenum permitted an advance in operating temperature of 50 to 100 degrees F.

For more highly stressed applications more complicated steels have been introduced which have much smaller creep rates; 0.4C-2.5Ni-0.7 Cr-0.3Mo is widely used for turbine rotors, while the 0.1C-12Cr-0.5 Mo steel has come to be almost universally used for turbine blading up to 925 degrees F. These steels, however, are selected more for their strength characteristics than for their creep properties. 0.35C-1.0W-0.6Cr-0.5Mo steel is finding a wide use for important bolting applications, such as bolting of turbine joints.

The introduction of complicated alloys is accompanied with certain risks, however. It is beginning to be suspected by metallurgists that sharp reductions in creep rates by alloying introduces a risk for intercrystalline cracking. R. W. Bailey, who has contributed much to this subject, has demonstrated that there is a limit in total deformation beyond which intercrystalline cracking is almost certain to appear. This limit is of the order of several per cent for carbon steel, but may be only one to two per cent in carbon molybdenum steels. There is a growing suspicion that high creep strength may be attainable only at the risk of intercrystalline fractures for large deformations. With this in mind, one must concur with the view that the carbon steels should be used wherever possible in preference to alloy steels even at the expense of theoretically higher creep rates.

Up to this point the creep problem has been discussed from the point of view of structures under simple tension, such as an ordinary tensile test piece. Very few of our engineering structures have this simple configuration, so that the test information is of very little use unless it can be extrapolated to more complicated types of applications. Much progress has been made in this respect in recent years and it is safe to state that the extension to combined stresses can now be made with sufficient accuracy for practical purposes so long as the stresses remain constant in time.

When the stresses do not remain constant in time, the premises for the calculation are not so clear. The most important example in this class of problems is the bolted joint. The bolts may be assembled at an initial stress of 50,000 pounds per square inch; after the passage of a year this stress may fall to 15,000 pounds per square inch. It is clear that, unless the bolts are re-tightened periodically, the joints must be designed to remain tight for the lower stress. It is a matter of importance, therefore, to be able to predict the reduction of stress with time.

An increase of the initial stress contributes very little to the elapsed time, while a slight lowering of the final stress causes an appreciable lengthening of the time. Greater elasticity of the bolt structure will increase the relaxation time. For a more accurate prediction of the relaxation time it is necessary to resort to direct relaxation tests for the material in question.

There is still another class of creep problems which have practical importance. In very thick cylinders, for example, the stress will vary considerably between the inside and the outside. Temperature gradients may accentuate the differences still further. Creep will generally tend to reduce these differences, so that in the initial stages of the process there is a readjustment of the space distribution of the stress. In general, the readjustment of stress will proceed until a steady state has been reached, after which the stress will remain constant in time. These stresses naturally are much more important, from the point of view of possible failure, than the elastic stress distribution usually considered. It is evident, moreover, that if such a cylinder is split along a diametrical plane, which is the case for turbine cylinders, a certain amount of distortion will have set in. Distortions of this type are probably the most serious aspect of creep phenomena in such structures as turbine cylinders. This subject is of great importance and much research is needed before the design of high-temperature equipment can be said to rest on a rational basis.

The phenomenon of fatigue under alternating and pulsating stress is known to become vastly more complicated with increases in the temperatures. In general, the fatigue strength drops rapidly with increases in temperatures above the region of 700 degrees F., but very little is known about the laws which govern this decrease. Of even greater significance is the fact that at high temperatures the fatigue phenomenon alters its essential characteristics and complications similar to the phenomenon of corrosion fatigue appear.

The name "corrosion fatigue" was introduced some years ago to define the deterioration of fatigue strength under corrosive conditions, due probably to some form of intercrystalline deterioration. In its more generalized implication, the name might be used to describe fatigue characteristics in which failure will occur at any stress, or at very low stress, after a sufficiently large number of reversals. This phenomenon is almost certain to be present in steam at temperatures in excess of 850 degrees F., and an intensive research program would be in order, to prepare for the general advance of temperatures beyond this value. This note of caution applies particularly to such details as turbine buckets, subjected to fluctuating stress where significant failures have already been encountered in high-temperature land installations.

Another phenomenon of similar character is the form of embrittlement which has been observed in bolts. Even though subjected to no rapid fluctuations of stress, there are many instances where flange bolts, which have been exposed to high temperatures for long periods of time, have fractured. Similar phenomena have been observed in boiler drums, turbine rotors and other details. These phenomena also belong to the class of intercrystalline fractures. The progress of the deterioration is most readily detected by impact tests. It may sometimes be removed by suitable heat treatment.

● Wear and Seizure

These phenomena occur with varying intensity in many of the important details of high-temperature turbines. The most important are bolts and nuts, valve-stem packings, valve seats, supporting lugs and keys, and labyrinth strips. These phenomena generally become increasingly more difficult with each advance in temperature. This important subject was discussed at great length in a symposium held some time ago by the American Society for Testing Materials. For the question of galling between sliding surfaces at high temperature, where lubrication is out of the question, hardness appears to be the most important criterion. Nitriding has become very important in this connection. 1.7C-18Cr steel has given good service for valve stems.

In many instances constructional modifications may be used to avoid difficulties of this nature. The most important example is the case of large bolts, where the present standards of thread fits cause severe concentrations of load on the first threads. High-temperature work calls for much looser thread fits. There are many instances where a change of this kind alone has avoided expensive troubles.

● Corrosion

There are no definite indications so far that the advance in steam temperature contemplated at present will materially alter the situation with regard to the general problem of corrosion in the path of the steam flow. Increases of operating pressure generally demand improvements in the purity of the feed water in order to avoid fouling of the turbine blading. The changes of material of boiler tubes, turbine blades and other details, which are dictated by creep and strength, have usually contributed to reduce corrosion.

Shore experience so far with high steam temperatures has demonstrated the need for attention to the risk of water in the oiling system, and corrosion from this cause in parts in contact with the oil. Higher steam temperatures make the problem of sealing at the ends of the turbines more difficult and increase the chance of drawing water into the oil. The presence of water in modern solvent refined oils appears

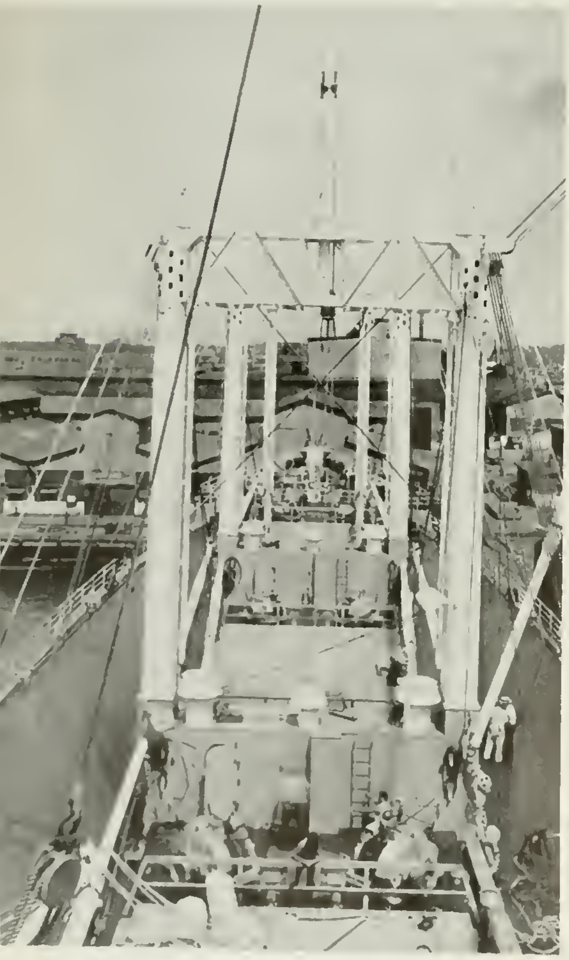
(Page 56, please)

Commission's First

C-2 STANDARD

Powered with America's Largest

Sun Shipbuilding and Dry Dock Company on July 6 will deliver the cargo motorship Donald McKay to the U. S. Maritime Commission, who will immediately turn her over to the Moore-McCormack Lines, Inc., for service in their American Scantic Line between New York and Baltic ports.



King posts and cargo winches.

In the following respects this is a very notable event and a very remarkable ship:

(1) This vessel is the first large seagoing cargo carrier built in an American shipyard for many years.

(2) This is the first delivery under the U. S. Maritime Commission replacement for the American cargo fleet in international trade.

(3) This motorship is the first diesel engined vessel in that program, and the beginning of America's first large fleet of diesel drive cargo carriers.

(4) The direct connected 6,000 (normal) shaft horsepower diesel engine installed in this ship is the largest marine diesel ever installed in an American cargo vessel.

- **Hull**

The hull of Donald McKay is the standard C-2 Maritime Commission design, of which 20 are now under construction, 10 for diesel drive and 10 for steam drive. The principal characteristics of this hull are:

Length O. A.	459′ 0″
Length B. P.	435′ 0″
Beam molded	63′ 0″
Depth S. D.	40′ 6″
Displacement loaded	13,900 tons
Draft loaded	25′ 9″
Total deadweight	9,220 tons
Cargo deadweight	7,613 tons
Cargo cubic cap.	540,000 cu. ft.
Normal S. H. P.	6,000
Sea speed	15½ knots
Fuel capacity	1,500 tons
Cruising radius	20,000 miles
Weight hull and machinery, approx.	4,680 tons

This design calls for a complete shelter deck type hull with raked stem and cruiser stern, and with seven transverse watertight bulkheads. There are five cargo holds, three of which are forward and two aft of the engine room space. The forward and the after collision bulkheads are carried watertight up to the shelter deck and the remaining five watertight up to the second deck, which is the freeboard deck. A third steel deck is fitted below the second deck from stem aft to the forward bulkhead of the machinery space and from the after bulkhead of the machinery space aft to the after end of hold No. 4.

On this third deck level (the lower tween decks) of No. 3 hold there are fitted four large and two small refrigerating chambers with a refrigerating machinery room built into the upper tween deck space of the same hold. The refrigerated cargo space has a total capacity of approximately 20,000 cubic feet.

Deep tanks are fitted in No. 2 hold and in No. 4 hold. The hull, together with its equipment and propulsion machinery, was built under special survey to the highest classification of the American Bureau of Shipping.

The transverse system of framing is used and all shell plating, inner bottom plating and shelter deck plating, seams and butts are riveted. All other joints in hull structure are welded.

Hatches are 20 feet wide and 30 feet long, except No. 1, which is 29 feet 3 inches long; and No. 3, which is 50 feet in length. Covers for No. 1 and No. 2 hatch on the shelter or weather deck level are of the pontoon type, made of ¼ inch steel plate welded into box sections 9 inches deep and spanning the opening thwartships without support of strongbacks. All other hatch covers are of the conventional strongback type using metal hatch boards, ex-

CARGO VESSEL

Seagoing Diesel

cept the oil tight hatches for the deep tanks, which are fitted with steel hinged covers closing on oil tight gaskets.

Six pairs of king posts support the booms for cargo handling. These posts, of steel tubing, are used as ventilating shafts for the cargo holds. Eighteen 5-ton cargo booms are fitted. On the after side of king post pair No. 3 a fitting is installed port and starboard to take a 30-ton boom. The majority of these booms are 60 feet long, and all booms are of tubular steel construction.

Eighteen American Engineering Company 50-horsepower electric cargo winches serve the cargo booms. These winches have a capacity for easily handling 3 tons at 220 feet per minute. Resistors for the control of cargo winch motors are housed in transverse erections at base of king posts.

As will be noted in the drawings and the illustration herewith, Donald McKay has a superstructure somewhat aft of amidships and directly over the engine room space. This four-story house accommodates quarters for officers and crew and for 12 passengers.

On the navigating bridge are located: The wheel house, gyro room, and chart room; the captain's office, captain's stateroom and captain's bath; and a 12 foot by 24 foot open air prom or lounging space port and starboard fitted with awnings and railed off from the open bridge.

These lounging spaces are neatly fitted with Oregon pine decking.

The bridge deck space is occupied by: six 2-passenger cabins each with a private bath; a room 22 feet square fitted as a dining saloon, a lounge, and an officers' mess; a pantry; three rooms housing ventilating fans and the emergency generator; and a radio room.

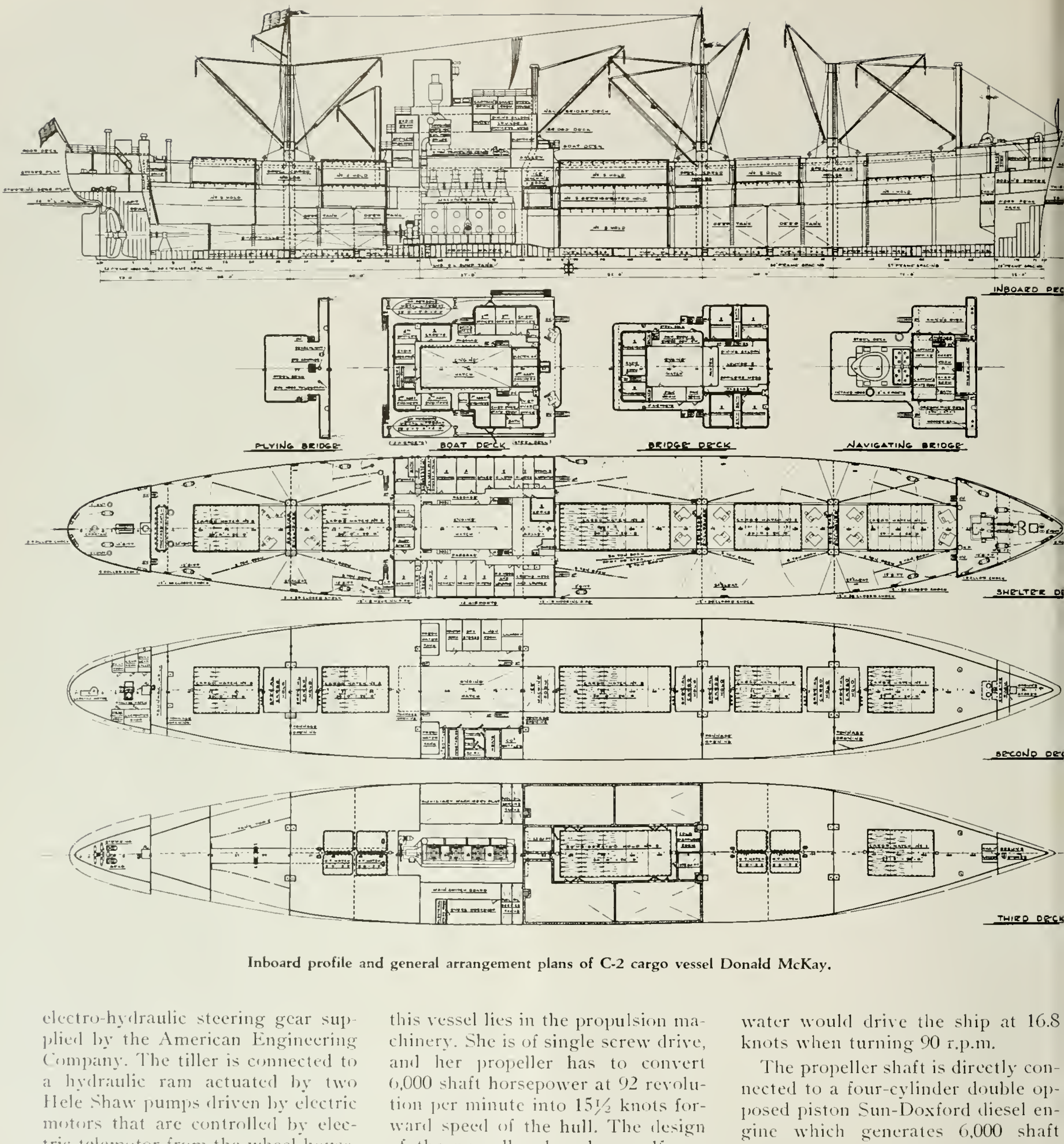
The passenger rooms are all outside corner rooms. Four of them are 10′ x 14′, and the other two 10 feet square. These rooms are equal in comfort and appearance to the best first class passenger accommodation on many passenger liners.

The boat deck gives space for all the officers quarters and for 2 metal lifeboats each of 60-person capacity. Each officer has an outside room and four have private baths.

All of the crew have their quarters in this deck house on the shelter deck level. Here also are the galley and the ship's hospital. Mechanical ventilation in great abundance is supplied to all living quarters. All bedrooms have hot and cold fresh water piped. All partitions and all furniture are of fireproof material.

The rudder is controlled by an

With her cruiser stern, raked stem, and fine sheer Donald McKay makes a fine appearance on her preliminary trials.



Inboard profile and general arrangement plans of C-2 cargo vessel Donald McKay.

electro-hydraulic steering gear supplied by the American Engineering Company. The tiller is connected to a hydraulic ram actuated by two Hele Shaw pumps driven by electric motors that are controlled by electric telemotor from the wheel house.

An American Engineering Company windlass driven by a 50-horsepower motor takes care of the anchors and of mooring lines forward, and a 35-horsepower electric capstan of the same make tends to warping ship aft.

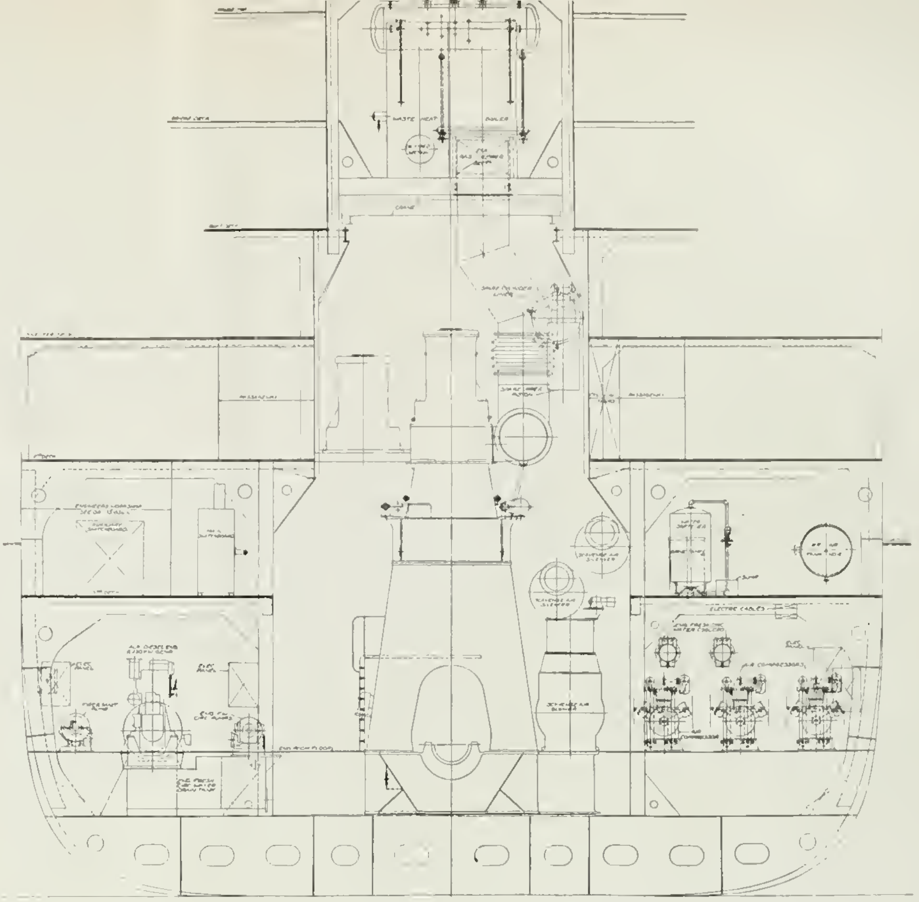
- **Propulsion Machinery**

The principal technical interest of this vessel lies in the propulsion machinery. She is of single screw drive, and her propeller has to convert 6,000 shaft horsepower at 92 revolution per minute into 15½ knots forward speed of the hull. The design of the propeller, based on self-propelled model tests at the Washington basin, calls for a three-bladed screw 20 feet in diameter and 21 feet pitch, with a mean width ratio of .20, an area ratio of .27, and a blade thickness fraction of .04. The tests demonstrated that this wheel, with the ship at her load line (4.75 feet of water over the blade tips), in still water would drive the ship at 16.8 knots when turning 90 r.p.m.

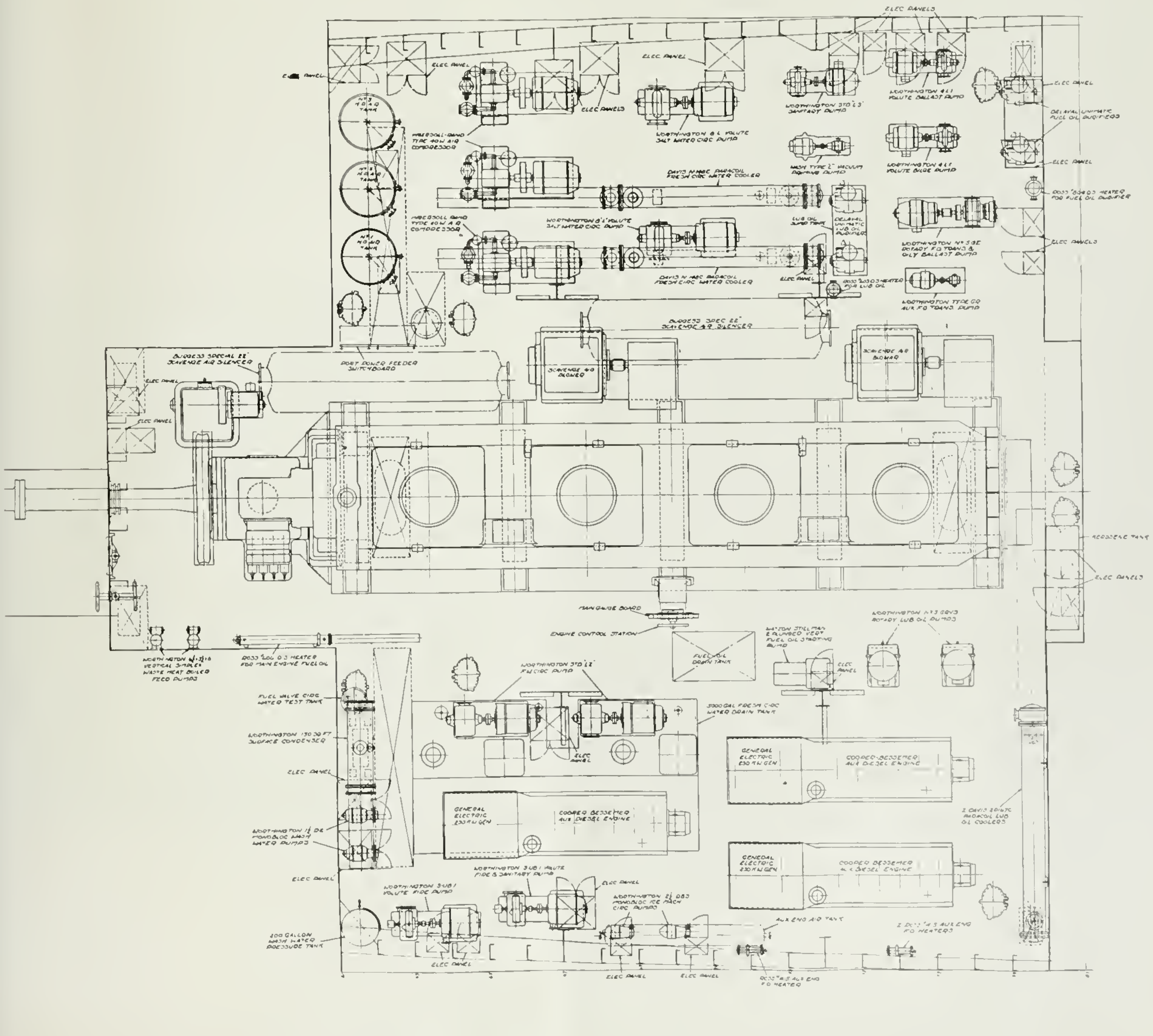
The propeller shaft is directly connected to a four-cylinder double opposed piston Sun-Doxford diesel engine which generates 6,000 shaft horsepower at 90 r.p.m. This is, so far as we know, the most powerful marine diesel engine ever built in America. It is guaranteed not to exceed at full power or at ¾ power a fuel consumption of 0.39 pounds of fuel (heat content 19,500 B.T.U. per pound) per shaft horsepower hour, and to run satisfactorily under a continuous 10 per cent overload, and for two hours under a 25 per cent overload. This engine, therefore, is able to generate 7,500 horsepower in 4 cylinders.

The opposed piston 2-cycle type cylinders of this engine have a bore of 32 inches and a combined stroke of 95 inches. At the full normal propeller shaft speed of 92 r.p.m. the piston speed works out at 728 feet per minute.

A Foster Wheeler waste heat gas fired steam generator takes the exhaust from this engine, muffles its noise, arrests its sparks and uses its heat to produce 50 lbs. steam in sufficient quantities to take care of all necessary heating, cooking, and hot water needs at sea. For harbor and emergency use this boiler is fitted to burn oil. Two Worthington simplex vertical steam pumps 6½ inches



At right: Transverse sectional elevation through engine room. Below: Plan of engine room floor.


ELEC PANELS
ELEC PANEL
ELEC PANEL
ELEC PANELS
No. 3 HO AIR TANK
No. 2 HO AIR TANK
No. 1 HO AIR TANK
INGERSOLL-RAND TYPE 40W AIR COMPRESSOR
INGERSOLL RAND TYPE 40W AIR COMPRESSOR
WORTHINGTON 8 L VOLUTE SALT WATER CIRC PUMP
WORTHINGTON 3TD 2.5" SANITARY PUMP
WORTHINGTON 4 L1 VOLUTE BALLAST PUMP
DELAVAL UNIMATIC FUEL OIL PURIFIERS
NASH TYPE 2" VACUUM PRIMING PUMP
WORTHINGTON 4 L1 VOLUTE BILGE PUMP
DAVIS N HBC PARACOIL FRESH CIRC WATER COOLER
ROSS "604 DS HEATER FOR FUEL OIL PURIFIER
WORTHINGTON 8 L VOLUTE SALT WATER CIRC PUMP
LUB OIL SUMP TANK
DELAVAL UNIMATIC LUB OIL PURIFIERS
WORTHINGTON No. 5 GE ROTARY F.O. TRANS & OILY BALLAST PUMP
DAVIS N HBC PARACOIL FRESH CIRC WATER COOLER
ROSS 403 DS HEATER FOR LUB OIL
WORTHINGTON TYPE GR AUX F.O TRANS. PUMP
BURGESS SPEC 22" SCAVENGE AIR SILENCER
BURGESS SPECIAL 22" SCAVENGE AIR SILENCER
PORT POWER FEEDER SWITCHBOARD
SCAVENGE AIR BLOWER
SCAVENGE AIR BLOWER
KEROSENE TANK
MAIN GAUGE BOARD
ENGINE CONTROL STATION
WORTHINGTON 4½-3½-6 VERTICAL SIMPLEX WASTE HEAT BOILER FEED PUMPS
ROSS "604 DS HEATER FOR MAIN ENGINE FUEL OIL
FUEL OIL DRAIN TANK
WATSON STILLMAN 2 PLUNGER VERT FUEL OIL STARTING PUMP
WORTHINGTON No. 3 GRVS ROTARY LUB OIL PUMPS
FUEL VALVE CIRC WATER TEST TANK
WORTHINGTON STD 2.2" F.W. CIRC PUMP
3000 GAL FRESH CIRC WATER DRAIN TANK
WORTHINGTON 130 SQ FT SURFACE CONDENSER
GENERAL ELECTRIC 230 KW GEN
COOPER-BESSEMER AUX DIESEL ENGINE
GENERAL ELECTRIC 230 KW GEN
COOPER BESSEMER AUX DIESEL ENGINE
GENERAL ELECTRIC 230 KW GEN
COOPER BESSEMER AUX DIESEL ENGINE
2 DAVIS 80 HTC PARACOIL LUB OIL COOLERS
WORTHINGTON 1½ DE MONOBLOC WASH WATER PUMPS
WORTHINGTON 3-UB1 VOLUTE FIRE & SANITARY PUMP
WORTHINGTON 3-UB1 VOLUTE FIRE PUMP
WORTHINGTON 2½ DBS MONOBLOC ICE MACH CIRC PUMPS
AUX ENG AIR TANK
2 ROSS "43 AUX ENG FO HEATERS
400 GALLON WASH WATER PRESSURE TANK
ROSS "43 AUX ENG FO HEATER

The galley features much use of stainless metal.

by 3 inches by 8 inches serve as feed pumps to the boiler.

All the auxiliaries are electrically driven, and power for this purpose is generated by three 250 K.W. diesel generating sets, the engine of each set being a 6-cylinder Cooper-Bessemer unit, and the electrical generator a General Electric dynamo. Electric light and power is all distributed from the main switchboard to control panels at each motor and at convenient locations in the crew and passenger accommodations.

The main engine cylinders and pistons are cooled by circulation of fresh water in a closed system which includes two Davis Engineering Company fresh water coolers wherein the fresh circulating water is cooled by sea water.

Fuel oil for the main engines is transferred from the main tanks to a "dirty oil" service tank which acts as a settling tank. From this tank it is pumped through a Ross fuel oil heater to the two De Laval "Unimatic" fuel oil purifiers and is discharged from these purifiers up to the "clean oil" service tank. The pure oil tank feeds the fuel pumps of the engine through either one of two Ross fuel oil heaters or goes through two smaller Ross heaters on the way to the fuel pumps of the auxiliary engines.

For starting and maneuvering air three motor-driven Ingersoll-Rand Type 40W air compressors serve four large high pressure air tanks.

Lubricating oil, after heating in a Ross heater, is purified in a pair of De Laval "Unimatic" lubricating oil purifiers and is then cooled for use in two Davis Engineering Company Paracoil lubricating oil coolers.

With the exceptions of one Nash "Hytor" vacuum priming pump and one Watson Stillman vertical two plunger fuel oil starting pump, all the pumps in the machinery spaces are Worthington. All of the motors are General Electric. These pumps include: One sanitary pump; two salt water circulating pumps; two fire pumps; two ice machine circulating pumps; one bilge pump; one ballast pump (all centrifugal); two rotary fuel oil transfer pumps; and two rotary lubricating oil transfer pumps.

Two large capacity scavenge air rotary blowers keep the main engine supplied with clean air. The discharge of each is fitted with a Burgess special 22-inch silencer.

A hand wheel conveniently located at the instrument board midway of the fore and aft length of the engine on the starboard side gives complete starting, stopping, reversing and speed control of this huge engine. A 9-ton Maris traveling crane spans a track mounted above the engine so that the engineer can easily remove a liner, piston or rod.

● Safety and Navigation

Completely equipped with radio so that she can keep in touch with both Europe or America during every part of her round trip voyage,

(Page 41, please)

Two views of the combination dining saloon, lounge, and officers' mess located on the bridge deck.

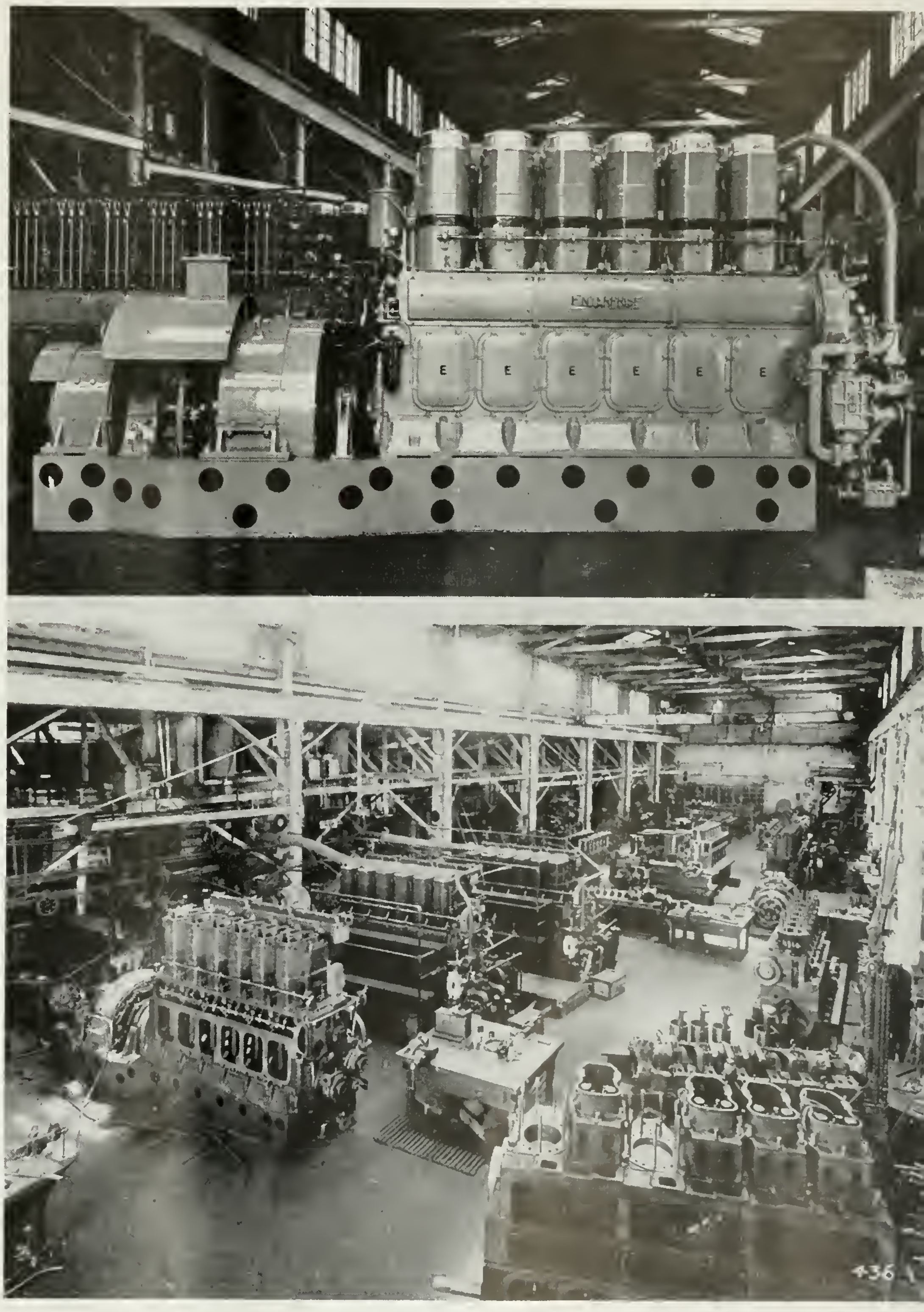
San Francisco Shop Busy *Building Diesel Engines* For U. S. Navy Harbor Tugs

The shop of the Enterprise Diesel Engine Company, San Francisco, is very busy finishing and testing the ten diesel electric main generating sets for five U. S. Navy diesel electric harbor tugs now building: two at Puget Sound Navy Yard, Bremerton, Washington; two at Charleston Navy Yard, Charleston, South Carolina; and one at Norfolk Navy Yard, Norfolk, Virginia.

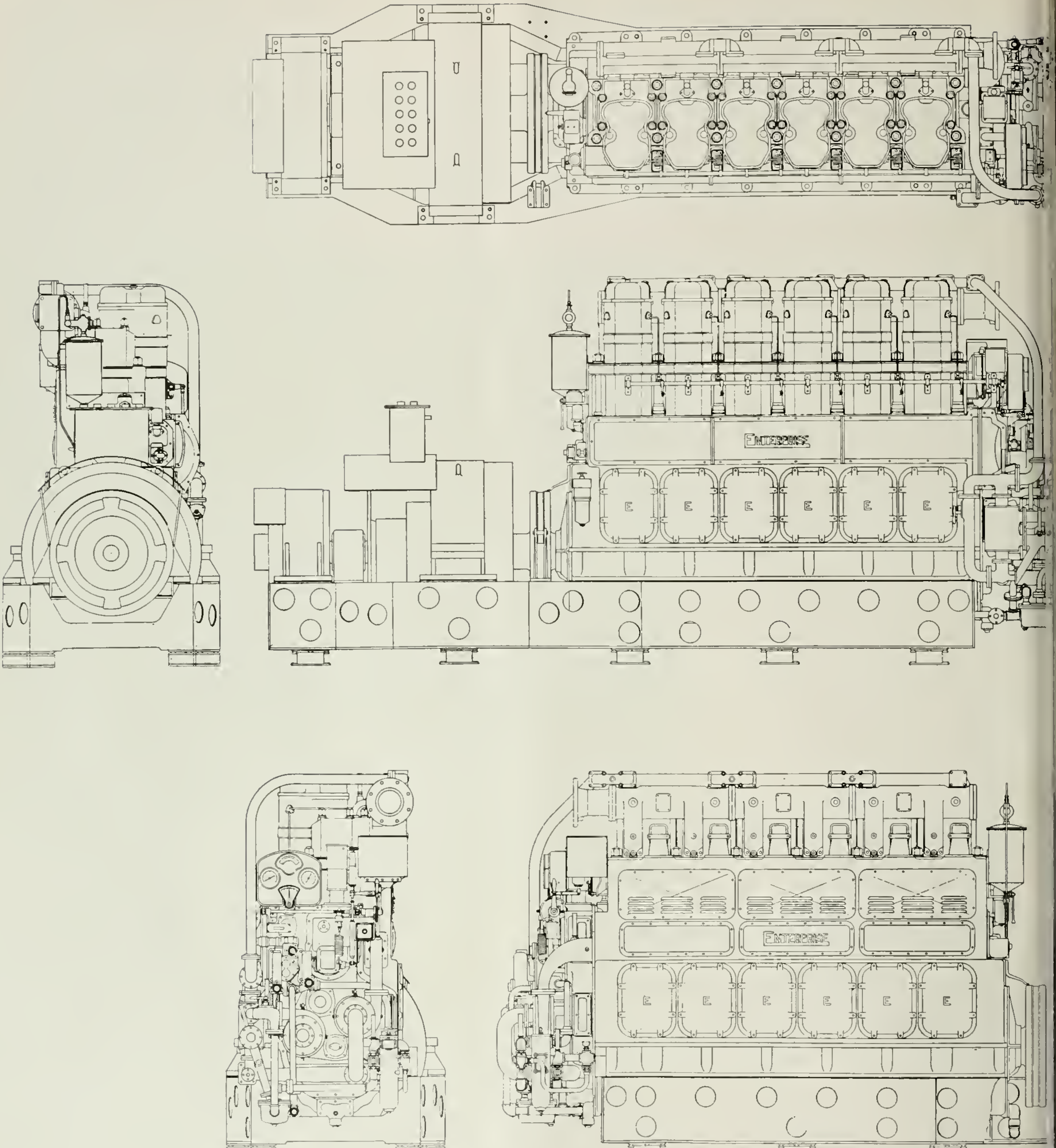
The Enterprise engine used in this set is a six-cylinder unit rated at 650 horsepower at 600 r.p.m. It is direct-connected to a 410 K.W. generator with a 30 K.W. exciter, both mounted on the extended engine bedplate. The ten engines supplied on this order are identical in design and construction, representing a new line of medium speed units which have been developed by Enterprise engineers. They are compact and streamlined, particularly with reference to the forward end assembly where such parts as recirculation pumps, heat exchangers, oil pumps, governor, throttle, starting switch, and gage board are located, all within easy control of the operator.

Each generator has a special winding to provide electric starting of the main engine from Exide heavy duty storage batteries. An automatic starting switch operates through a relay on the main switchboard to start the engine, the batteries being automatically recharged while the engines are in operation.

We had the privilege of watching one of these sets running on the test stand. It was mounted as it will be when installed in a tug, with 10 Kor-



At right are shown (upper) one of the 650-H.P. Enterprise diesel generating sets for the Navy harbor tugs, and (below), the Enterprise Diesel Engine Company shop at San Francisco, showing seven 650-S.H.P. engines under construction.



The Enterprise 650-S.H.P. diesel engine. Upper: Plan of engine direct connected to generator and exciter on same bedplate. Center: Elevation of after end and starboard side elevation of diesel engine generating sets. Lower: Elevation of forward end of diesel electric generating set (note compact arrangement of pumps, heat exchangers, and control mechanism) and port side elevation of engine.

fund Vibration Damper pads under the bedplate. It ran at various speeds and loads with no appreciable vibration and with a clear exhaust. Every mechanism functioned perfectly.

As is shown in the illustrations and drawings reproduced herewith, this diesel engine is of the completely closed modern design with ample provision for access doors and with self-contained auxiliaries.

The cylinders are cast enbloc from special alloy cast iron, being fitted with liners of cast chrome nickel iron. Pistons are aluminum cast by the Aluminum Company of America. The bore is 12 inches and the stroke 15 inches.

A closed fresh water cooling system keeps the cylinders at a reasonable operating temperature. The fresh water in this system is cooled in special heat exchangers supplied by the Harrison Radiator Co.

The crank shaft is a single forging of alloy steel forged by the Moore Dry Dock Company of Oakland, California.

The common bed for engine and generator is of welded steel construction. The control of this engine as applied in the electric propulsion of the Navy tugs is very interesting. A Woodward hydraulic governor regulates the speed within fixed limits at any setting of the fuel pumps. A special electro-magnetic speed control with six positions regulates the engine speed between 300 and 600 r.p.m. to meet torque required of the propulsion motor. This control, designed and supplied by the Westinghouse Electric and Manufacturing Company, is arranged for local or remote operation. For hull speeds below those corresponding to 300 r.p.m. of the engine, there is direct electrical control of the propulsion motor speed without altering the speed of the engine.

This type of control has functioned with great efficiency in a number of recent diesel - electric tugs.

The Bosch system of fuel injection is used with an individual pump for each cylinder.

Valve tappets of the "Zero-Lash" type, manufactured by the Wilcox-Rich Company, are fitted and are very effective in maintaining efficient, quiet valve action and uniformly good combustion.

Enterprise Diesel Engine Company are standardizing on this type and size of cylinder in the power range from 600 to 1300 shaft horsepower. The six-cylinder model takes care of 600 to 700 horsepower without supercharging. With supercharging, six cylinders will generate up to 1000 S.H.P.

An eight-cylinder model develops 940 shaft horsepower without supercharging and with supercharging will deliver up to 1350 shaft horsepower.

A 600-H.P. directly reversible Enterprise diesel engine drives the New York tug Dauntless No. 12.

FIRST C-2 CARGO VESSEL and America's Largest Diesel

(Continued from page 38)

Donald McKay is fitted with all the better known emergency, safety and sanitary apparatus.

Water for wash and drinking purposes is kept in condition by a Permutit Company water softener. For hot wash water in the accommodations a "Taco" heater was installed.

For detection of fire a Rich smoke detection cabinet is installed in the pilot house and connected by tubing to each cargo space. A complete C-O-Two system covers the engine room and the cargo space. The flasks of CO_2 are located in a room at the port side of the machinery space on the second deck level at the starboard side. There are 125 flasks of the 50 pound size installed.

For warning signals two whistles are mounted on the stack, one a good steam whistle; the other, the noted Leslie "Tyfon" air siren.

The engine direction indicator was supplied by Bethlehem, and the engine revolution indicator by the Electric Tachometer Co.

A McNab oil and water separator protects the tubes of the waste heat boiler.

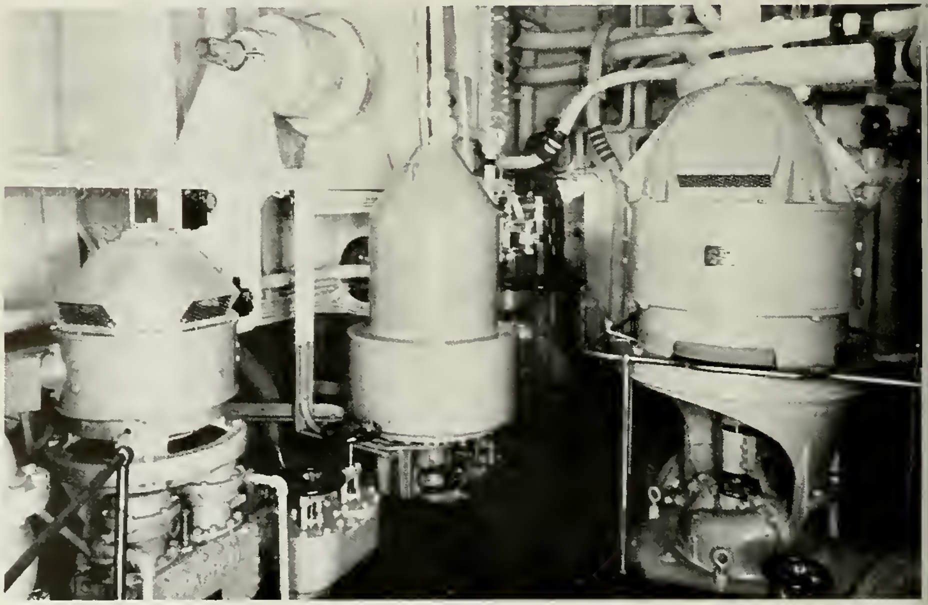
Signals are transmitted and received between pilot house and engine room over a Bendix electric engine room telegraph.

In the pilot house we find: a radio direction finder of the latest type; a Sperry gyro master compass and 3 repeaters; a Sperry automatic helmsman; and a voice powered telephone system connecting with several important stations on the vessel.

MODERN
Marine Electric Auxiliaries

By A. O. LOOMIS, Marine Engineer
Westinghouse Electric & Manufacturing Company,
East Pittsburgh, Pennsylvania

The electrically driven auxiliaries aboard the new liner Panama represent most modern practice in marine auxiliary installation and are therefore of particular interest to owners and operators of steamships. Among the features of special interest are: centralized group control for engine room auxiliaries; cargo winch motors and control with a high ratio of load hoisting to empty-hook speed; the manner of using the capstan motor to steer the vessel in emergencies; and the conveyors in the refrigerated cargo spaces.



Group Control Simplifies Operation

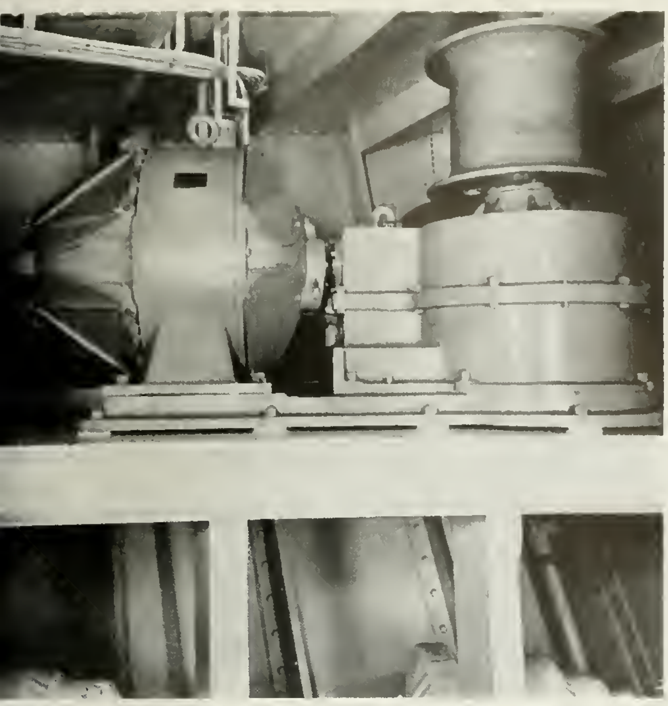
All auxiliary controls are grouped in centralized locations on "dead-front" panelboards of steel. The controls are arranged in three groups:

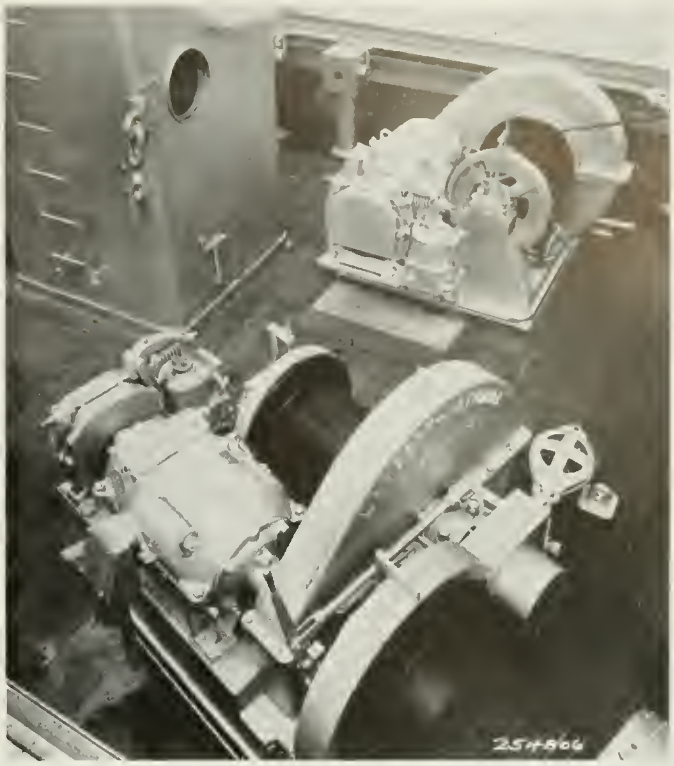
1. The vital engine and boiler room auxiliaries.
2. Other engine and boiler room auxiliaries.
3. Refrigerating room auxiliaries.

The first two groups are adjacent to the main switchboard; the other is in the refrigeration machinery space. This grouping offers the great advantage of more convenient, more rapid operation—which will be particularly advantageous during emergencies. The dead-front panels prevents contact with live parts, a safety feature of value particularly during heavy weather.

High-Speed Handling of Cargo

There are eight single-gear winches, each of which can handle 3500 pounds at 280 feet per minute, and four double-gear winches that can hoist 5500 pounds each at 160 feet per minute. The empty hook or lowering speed is approximately 625 feet per minute. This high ratio of empty-hook speed to full-load hoisting speed of 2.2 comes from the use of a compound-wound direct-current





notor instead of the series motor. Vhen used to retard loads in the owering direction, the motor, operated as a compound-wound generator, returns current to the line.

This hoisting system also provides he low landing speed of about 20 eet per minute when lowering the ated load. This obviates the "inching" process or plugging of the motor required by other systems to and heavy or fragile loads safely.

Submersible Bilge Pump

The bilge-pump motor can be operated even when submerged. This s made possible by a watertight enlosure above the base of the vertical notor.

In the steering gear room are two 5-H.P. motors connected through vorm gears to the capstans above leck. On each shaft between the gear and the deck is a drum. By neans of lines and tackles these lrums can be connected to the emergency tiller on the rudder stock. Steering of the vessel can thus be asily accomplished by means of the apstan motors.

Cargo Handling Conveyors

For the refrigerated cargo spaces here are four conveyors, permanently installed, two forward, two aft. hree-horsepower motors with disk rakes operate the conveyors when oaded with bananas, frozen meat, or package cargo. These conveyors are so installed that side-port operation is possible.

Rat-Proof Installation

In keeping with the program to make the vessel completely rat-proof, the rats are denied even the small privilege of using the motor insulation as food or nesting material. In addition to the trip-proof protection the motors and controls have semi-enclosing covers, whose openings are much too small for rats or even mice.

An Efficient Spark Arrester Silencer

Practically universal approval from the marine public has met the Maxim Silencer SC2.

This model is a combination exhaust silencer and spark arrester, for vertical installation only, and is used in vessels, both small and large, having a stack exhaust. The Maxim SC2 will effectively prevent the emission of live sparks and carbon thrown out by the engine exhaust, and will at the same time give a high degree of silencing.

Constructed entirely of sheet and plate steel, securely welded together, the SC2 has no nuts or bolts to come loose and rattle. It differs from competitive spark arresters in that its operation is not dependent upon one method of spark trapping, but upon two.

A whirling action imparted to the exhaust gas as it enters the silencer, plus the force of gravity, drop sparks and carbon into the bottom of the cone, which is located within the silencer, and thence into an easily cleanable carbon collector. This spark arrester silencer has been approved by the Bureau of Marine Inspection and Navigation for use on vessels engaged in the transportation of fuel oil and gasoline.

The Maxim Model SC spark arrester muffler is very similar to the SC2 and differs only in that it is not equipped with low frequency sound chambers and consequently will not give as efficient silencing. The spark arrester part of the SC is identical with that of the SC2, and the same high efficiency in spark catching will be obtained with this model. The SC is usually installed on tugboats, tankers, or other types of vessels where high quality spark arresting is essential, but where noise reduction is not so important.

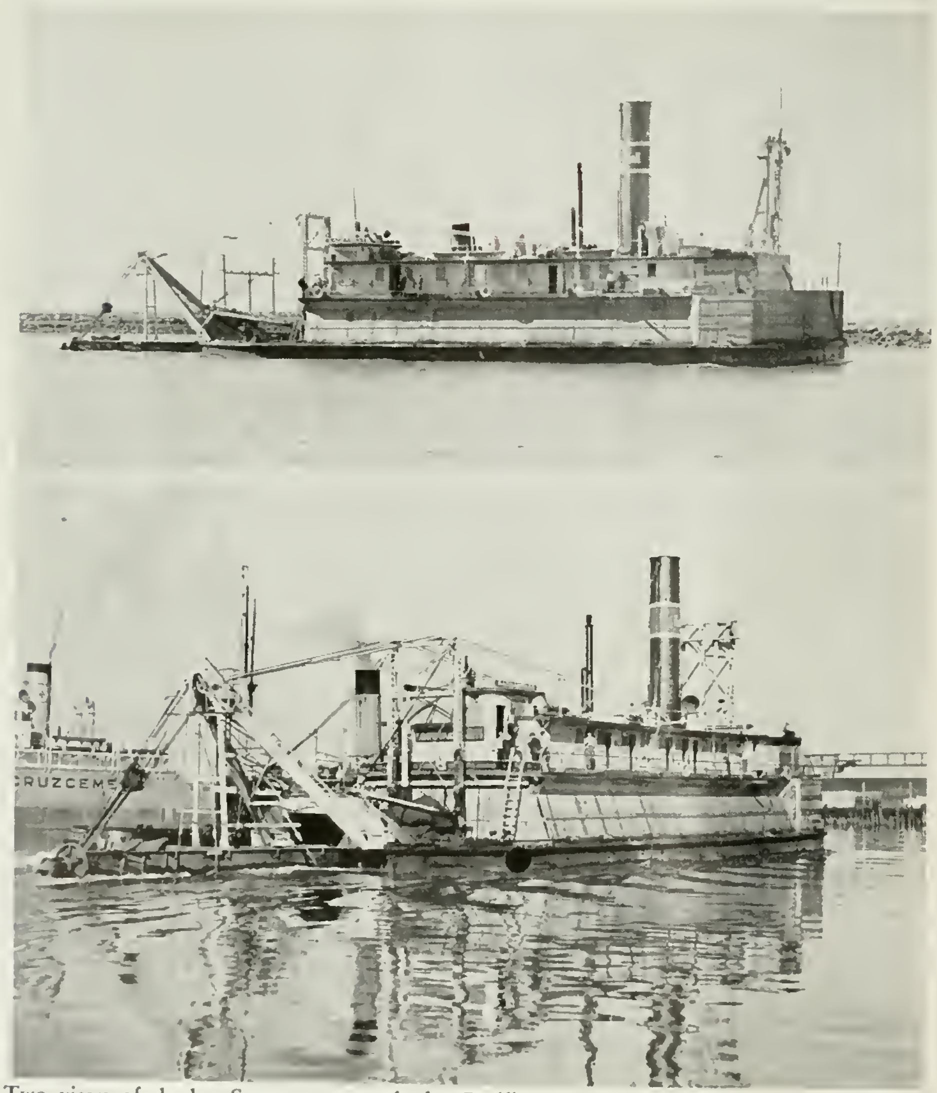
This model has also been approved by the Bureau of Marine Inspection and Navigation.

From River Mud to Ocean Coral

At the Oakland, California, yard of the General Engineering & Dry Dock Co. the U. S. Army Engineers dredge Sacramento has been going through a transformation process to fit her for efficiently working in coral and sand and to prepare her for a long ocean tow out to Midway Island.

Special plans required for the remodeling of the dredge were made and the work done under the direction of the Division Engineer, United States Engineers Department, South Pacific Division.

The Sacramento was built in 1913 at Pittsburg, California, by the Army Engineers for work on the Sacramento River channel. She has a steel hull and wooden deck house. Oil fired steam boilers supply the power, which is applied through a triple expansion engine direct connected to a 20 inch dredging pump. The suction pipe and a cutter head shaft are carried on a ladder which swings on a joint at the forward end of the hull and is hoisted or lowered with cables operated on multiple drums driven by a steam engine and controlled from a pilot house on the forward end of the deck house. The ladder and the tackle are supported by a steel "A" frame which is built into the shallow draft hull, and braced by tie rods.



Two views of dredge Sacramento, ready for Pacific Ocean tow, being taken down Oakland estuary for delivery at Army Transport dock, San Francisco.

Towed across 3,000 miles of Pacific Ocean

Since this dredge is now to be used in carving out a harbor at Midway Island for seaplanes and supply ships, it became necessary not only to make her watertight in house and hull, but also to strengthen her hull, ladder, and machinery for the heavier work of cutting coral and the additional burden imposed by the greater weight of details made necessary by that work.

To cut coral, the Army Engineers designed a heavy cast steel cutter head with square tapered sockets to which may be attached various forms of cutters. Calculations and experiments with this head indicated that it would do the work but would require a larger shaft and more power. This called for a strengthening of the ladder frame and of the "A" frame, and these were practically rebuilt and fitted with the bearings for the larger shaft.

It was found on inspection that the deck plating in way of the wooden decking was badly corroded, and this was all renewed. The machinery was all overhauled and parts renewed where necessary.

A new Kimball-Krogh centrifugal bilge pump was installed.

The Sacramento is fully equipped to take care of a crew of 10 officers and 30 men. Fresh water to take care of the needs of this crew and to provide make up feed for boilers is quite a problem on a coral atoll like Midway Island. To solve this problem the dredge has been fitted with a large capacity Davis Paracoil Evaporator and a Davis Paracoil distiller.

To make everything snug for the long tow the ladder is secured in position and two 2⅛" wire cables are carried along above the "A" frame tie rods and fastened to the "A" frame so as to give an added insur-

(Page 45, second column)

A White *Wanderbird* Acquires Red Wings

The schooner Wanderbird of San Francisco, Captain Warwick M. Tompkins owner and master, has recently been fitted to a new suit of sails in red canvas by the expert sailmakers of the Haviside Co. of San Francisco. Our illustration shows the vessel in San Francisco Bay returning from a short cruise trying out the new sails.

This Wanderbird is a notable sailing schooner. She is now in her 60th year. In 1936, after weathering North Sea gales for nearly fifty years of Hamburg pilot duty, and after seven years of cruise sailing which covered the Atlantic Ocean and all its great branch seas, the Wanderbird in 1936 rounded Cape Horn in a voyage from Gloucester, Massachusetts, to San Francisco, California. She uses no power other than the wind and is said to be the largest registered yacht without power.

Her present owner bought her in Hamburg in 1928 and has sailed her 110,000 miles since that year. He and his wife and two children make the vessel their home and operate her in cooperative study cruises during which the persons on cruise work the ship and share expenses.

The presently projected cruise is one of the most ambitious that Captain Tompkins has undertaken. It will take the Wanderbird and her crew round the world north of the equator. Sixteen persons have signed up for this voyage.

Wanderbird's hull has an overall length of 85', a water line length of 76', a molded beam of 18' 6", a draft of 11' and a displacement of 138 tons. She was built of white oak and greenheart fastened with trenails and copper, copper sheathed and fitted with shipsmithing of the best Swedish iron.

The old German master shipbuilder of Wavelsfleth, Gustave Junge, and the pilots of the free city of Hamburg, designed and built this hull to serve shipping in the North Sea, regardless of weather, and their judgment and skill are attested by the fact that sixty years of seafaring over the seven seas have not sated Wanderbird's appetite for ocean treks.

And so she is now fitted with a fine suit of red lower sails preparatory to her greatest voyage. These sails include: the mainsail, which spreads 1192 square feet of canvas; the foresail, with an area of 675 square feet; the staysail, which stretches 308 square feet; and the big single jib, with approximately 400 square feet area. All of these are fashioned from No. 2 Natthol Red canvas furnished by the Wm. L. Barrell Company from their famous Lincoln Mills.

There is quite a thrill in the thought of this fine, stanch vessel with her red sails set, beating out of the Golden Gate and squaring away under the control of her master, whose "purpose holds to sail beyond the sunset and the baths of all the Western stars."

Dredge Sacramento

(Continued from page 44)

ance that no sudden shock will carry away the ladder and its support.

Large towing bitts and chocks and a wire cable bridle were fitted aft and through these the hull will be towed by a long 12" manila Tubbs Supercore hawser 3" diameter weight chain from the stern of a transport.

Since she has very little freeboard she is being sealed by heavy pine planking from the hull deck to the top of the first deck house level. The planks and scantlings forming this barrier, which is virtually the shell of a wooden ship, are very heavy and are securely bolted and spiked. The planks are fitted tongue and groove and are laid up in pitch.

The Sacramento is 198 feet long overall, 40 feet beam and 11 feet 6 inches deep. The repairs, new equipment, and preparations for towing cost approximately $150,000.

The Wanderbird.

The Deceleration and Acceleration of Ships

By D. W. DICKIE

It often pays to decelerate promptly.

DERIVATION OF THE FORMULAS SHOWN ON SHEET 1

APPENDIX C

INTERMITTENT DECELERATION

In the case of a vessel coasting with the propeller held still an excellent approximation of the condition which covers the period that most vessels actually coast this way is found by using 32% of the power backing. By assuming $R = .32\,r\,V_1^2$ and substituting in formula (3)

$$L = \frac{D}{g\,r\log_{10}e}\log_{10}\left(\frac{r\,V_1^2}{.32\,r\,V_1^2} + 1\right]^{\frac{1}{2}}$$

$$L = \frac{D}{g\,r\log_{10}e}\log_{10}\left(\frac{1}{.32} + 1\right]^{\frac{1}{2}}$$

$$L = \frac{D}{45.389\,r}$$ which is equation (5) using 32% power backing

To get the intermediate points of the curve substitute in equation (2) $.32\,r\,V_1^2 = R$ Let $V_0 = 0$ and for $V_1^2 = 1^2$ put $V_{1/2}^2 = (\frac{1}{2})^2$ Equation (2) becomes

$$L_{1/2} = \frac{D}{g\,r\log_{10}e}\log_{10}\left(\frac{r\,V_{1/2}^2 + .32\,r\,V_1^2}{r\,V_0^2 + .32\,r\,V_1^2}\right]^{\frac{1}{2}}$$

$$L_{1/2} = \frac{D}{g\,r\log_{10}e}\log_{10}\left(\frac{r(1/2)^2 + .32\,r(1)^2}{.32\,r(1)^2}\right]^{\frac{1}{2}}$$

$$L_{1/2} = \frac{D}{g\,r\log_{10}e}\log_{10}\left(\frac{.25}{.32} + 1\right]^{\frac{1}{2}}$$

$$L_{1/2} = \frac{D}{111.41\,r}$$ which is formula (7) using 32% power backing. The remainder of the equations are found in SHEET ONE.

In the case of a vessel coasting with the propeller being turned by the engine at insufficient revolutions to provide propulsion an excellent approximation of the condition which covers the period that most vessels coast this way is found by using 22% of the power backing. By assuming $R = .22\,r\,V_1^2$ and substituting in formula (3)

$$L = \frac{D}{g\,r\log_{10}e}\log_{10}\left(\frac{r\,V_1^2}{.22\,r\,V_1^2} + 1\right]^{\frac{1}{2}}$$

$$L = \frac{D}{g\,r\log_{10}e}\log_{10}\left(\frac{1}{.22} + 1\right]^{\frac{1}{2}}$$

$$L = \frac{D}{37.546\,r}$$ which is formula (5) using 22% power backing.

To get the intermediate points of the curve substitute in equation (2) $.22\,r\,V_1^2 = R$ Let $V_0 = 0$ and for $V_1^2 = 1^2$ put $V_{1/2}^2 = (1/2)^2$ Equation (2) then becomes

$$L_{1/2} = \frac{D}{g\,r\log_{10}e}\log_{10}\left(\frac{r\,V_{1/2}^2 + .22\,r\,V_1^2}{r\,V_0 + .22\,r\,V_1^2}\right]^{\frac{1}{2}}$$

$$L_{1/2} = \frac{D}{g\,r\log_{10}e}\log_{10}\left(\frac{r(1/2)^2 + .22\,r(1)^2}{.22\,r(1)^2}\right]^{\frac{1}{2}}$$

$$L_{1/2} = \frac{D}{g\,r\log_{10}e}\log_{10}\left(\frac{(1/2)^2 + .22}{.22}\right]^{\frac{1}{2}}$$

$$L_{1/2} = \frac{D}{84.73\,r}$$ which is formula (7) using 22% power backing. The remainder of the equations will be found in SHEET ONE

To determine the time that will elapse after engines are held still and assuming that the power for reversing is only 32% of that going ahead the retarding force becomes $R = .32\,r\,V_1^2$ and substituting in formula (36) it becomes

$$T = \frac{D}{r^{\frac{1}{2}}g(.32)^{\frac{1}{2}}r^{\frac{1}{2}}V_1}\tan^{-1}\left(\frac{r^{\frac{1}{2}}V_1}{(.32)^{\frac{1}{2}}r^{\frac{1}{2}}V_1}\right]$$

$$T = \frac{D}{r\,g\,V_1(.32)^{\frac{1}{2}}}\tan^{-1}\left(\frac{1}{(.32)^{\frac{1}{2}}}\right]$$

The reciprocal of $(.32)^{\frac{1}{2}}$ is 1.767767 and the angle whose tangent is 1.767767 = 60° 30.23' and the circular arc of this angle is 1.0559242 Combining the constants

$$T = \frac{D}{17.22714\,r\,V_1}$$ which is formula (37) using 32% of the power backing.

If we substitute in formula (36) $V_{7/8} = 7/8$ $V_{3/4} = 3/4$ $V_{5/8} = 5/8$ $V_{1/2} = 1/2$ etc., for $V_1 = 1$ keeping $R = .32\,r\,V_1^2$ formula (36) becomes

$$T_{7/8} = \frac{D}{r\,V_1\,18.1921}\tan^{-1}\left(\frac{r^{\frac{1}{2}}V_{7/8}}{(.32)^{\frac{1}{2}}r^{\frac{1}{2}}V_1}\right]$$

$$T_{7/8} = \frac{D}{r\,V_1\,18.1921}\tan^{-1}\left(\frac{7/8}{(.32)^{\frac{1}{2}}}\right]$$

.875 divided by $(.32)^{\frac{1}{2}}$ = 1.546795 The angle whose tangent is 1.546795 = 57°7' and the circular arc of this angle = .9968739 Combining the constants we get

$$T_{7/8} = \frac{D}{18.2482\,r\,V_1}$$ which is formula (44) for 32% power backing The remainder of the time formulas for 32% power backing are found in SHEET ONE.

To determine the time that will elapse after the engine is slowed to the point where it is merely being turned, that is where the power reversing is assumed to be 22% of that going ahead, the retarding force becomes $R = .22\,r\,V_1^2$ and substituting in formula (36) it becomes

$$T = \frac{D}{r^{\frac{1}{2}}g(.22)^{\frac{1}{2}}r^{\frac{1}{2}}V_1}\tan^{-1}\left(\frac{r^{\frac{1}{2}}V_1}{(.22)^{\frac{1}{2}}r^{\frac{1}{2}}V_1}\right]$$

$$T = \frac{D}{r\,g\,V_1(.22)^{\frac{1}{2}}}\tan^{-1}\left(\frac{1}{(.22)^{\frac{1}{2}}}\right]$$

The reciprocal of $(.22)^{\frac{1}{2}}$ = 2.132 The angle whose tangent is 2.132 = 64°52'15" and the circular arc of this angle is 1.13221. Combining the constants we get

$$T = \frac{D}{13.3227\,r\,V_1}$$ which is formula (37) for 22% power backing.

If we substitute in formula (36) $V_{7/8} = 7/8$ $V_{3/4} = 3/4$ $V_{5/8} = 5/8$ $V_{1/2} = 1/2$ etc, for $V_1 = 1$ keeping $R = .22\,r\,V_1^2$ formula (36) becomes

$$T_{7/8} = \frac{D}{r\,V_1\,15.084}\tan^{-1}\left(\frac{r^{\frac{1}{2}}V_{7/8}}{(.22)^{\frac{1}{2}}r^{\frac{1}{2}}V_1}\right]$$

$$T_{7/8} = \frac{D}{r\,V_1\,15.084}\tan^{-1}\left(\frac{7/8}{(.22)^{\frac{1}{2}}}\right]$$

7/8 divided by $(.22)^{\frac{1}{2}}$ = 1.8655 The angle whose tangent is 1.8655 = 61°48'24" and the circular arc of this angle is 1.07873 Combining the constants

$$T_{7/8} = \frac{D}{13.9832\,r\,V_1}$$ which is formula (44) using 22% power backing. The remainder of the time formulas for 22% power backing are found in SHEET ONE.

David W. Dickie

Editorial Note

This mathematical analysis and derivation was prepared by the author in manually printed form on sheets from which cuts were made by the engraver for reproduction in Pacific Marine Review.

DERIVATION OF THE FORMULAS SHOWN ON SHEET 1

APPENDIX A

To determine the distance a vessel will go after the engines are reversed before coming to rest or just on the point of going backwards

Let D = the displacement of the vessel in pounds

V_1 = the maximum velocity of the vessel in FEET per second at the instant the engines are going full speed astern

V = the velocity of the vessel when she has passed over (x) feet from the instant when the engines were going full speed astern (in FEET per SECOND)

x = the distance traveled after the engines are reversed in feet

L = total distance, in feet, vessel has passed over (after the engines are going astern) before coming to rest or just on the point of going backwards

r = resistance of the vessel in pounds at unit velocity (one foot per second)

g = accelerating force of gravity = 32 2 feet per second per second

R = retarding resistance (in pounds) due to the propeller when engines are going full speed astern (assumed constant). The last assumption requires some thought as the propeller comes gradually up to speed in reverse and further its efficiency varies even if it is kept at constant revolutions due to the fact that the speed of the ship is changing as she comes to rest

e = 2 71828 the base of the Naperian Logarithms

The total resistance (P) in pounds retarding the vessel at the instant when the velocity has been reduced to (V) feet per second

$$P = -(rV^2 + R) \qquad (1)$$

The resistance is here assumed to vary as the (velocity)^2 whereas it is well known that the frictional resistance varies as the (nth) power of the speed where (n) varies from 1 83 to 2 16 The wave making resistance is not of paramount importance as the wave formation usually subsides very rapidly

Since Force = Mass x Acceleration

$$\frac{\text{Force}}{\text{Mass}} = \text{Acceleration}$$

$$\text{Mass} = \frac{\text{Weight or Displacement in Pounds}}{\text{Acceleration of gravity} = 32\ 2} \approx \frac{D}{g}$$

the decrease in acceleration of the vessel would be

$$\frac{\text{Force} = P}{\text{Mass} = M} = -\frac{g}{D}(rV^2 + R) = \frac{dV}{dt} \text{ since deceleration } = \frac{dV}{dt}$$

Also the distance traveled (x) is taken as a function of the time to give the equasion of position $x = f(t)$

The velocity of a moving point is the rate at which the distance (x) changes with respect to the time (t) and may be uniform or varying

$$V_x = \frac{dx}{dt} \text{ so } \frac{1}{dt} = \frac{V_x}{dx} \qquad \frac{P}{M} = -\frac{g}{D}(rV_x^2 + R) = \frac{dV}{dt} = \frac{V_x dV}{dx}$$

$$\therefore\ dx = -\frac{D}{g}\left(\frac{V_x dV}{rV_x^2 + R}\right) dV$$

To find the distance (x) integrate this expression between the limits of V_1 and V as indicated

$$x = \int_V^{V_1} -\frac{D}{g}\left(\frac{V_x\, dV}{rV_x^2 + R}\right) = -\frac{D}{g}\int_V^{V_1}(rV_x^2 + R)^{-1} V_x\, dV$$

$$\text{let } u = rV_x^2 + R \qquad du = r2V_x dV + 0 \qquad \frac{du}{2r} = V_x dV$$

$$x = -\frac{D}{g}\int_V^{V_1}\frac{1}{2r}u^{-1}\,du = -\frac{D}{2gr}\int_V^{V_1}u^{-1}\,du = -\frac{D}{2gr}\ln u$$

$$x = -\frac{D}{gr}\ln u^{\frac{1}{2}} = \left[-\frac{D}{gr}\ln(rV_x^2 + R)^{\frac{1}{2}}\right]_V^{V_1}$$

$$\text{When } V_x = V_1 \qquad x = -\frac{D}{gr}\ln(rV_1^2 + R)^{\frac{1}{2}}$$

$$\text{When } V_x = V \qquad x = -\frac{D}{gr}\ln(rV^2 + R)^{\frac{1}{2}}$$

$$\text{Subtracting } x = -\frac{D}{gr}\left[\ln(rV_1^2 + R)^{\frac{1}{2}} - \ln(rV^2 + R)^{\frac{1}{2}}\right]$$

$$x = -\frac{D}{gr}\ln\left[\frac{rV_1^2 + R}{rV^2 + R}\right]^{\frac{1}{2}}$$

ln = the logarithm to the base (e) and means the use of a table of hyperbolic logarithms. This is awkward and since

$$\log_{10}e = 43429 \text{ and } \log_{10}z = 43429 \log_e z$$

$$\log_e z = \frac{\log_{10} z}{.43429} = \frac{1}{\log_{10} e}\log_{10} z$$

$$\therefore\ x = -\frac{D}{gr\log_{10}e}\log_{10}\left(\frac{rV_1^2 + R}{rV^2 + R}\right)^{\frac{1}{2}} \qquad (2)$$

This expression gives the distance run (x) when the velocity has been reduced from V_1 to V feet per second.

When the vessel comes to rest, or is just on the point of going backwards, then $x = L$ and $V = 0$

Equasion (2) consequently becomes

$$L = \frac{D}{gr\log_{10}e}\log_{10}\left(\frac{rV_1^2}{R} + 1\right)^{\frac{1}{2}} \qquad (3)$$

If it is now assumed that (R) the retarding resistance due to the action of the propeller = rV_1^2 that is = the resistance of the vessel at velocity V_1 we have the case of the vessel using 100% power reversing

The reciprocating steam engine and most diesel engines use full power both ways so we will take that assumption first Equasion (3) becomes

$$L = \frac{D}{gr\log_{10}e}\log_{10}\left[\frac{R}{R} + 1\right]^{\frac{1}{2}} = \frac{D}{gr\log_{10}e}\log_{10}(2)^{\frac{1}{2}} \qquad (4)$$

$$L = \frac{D}{r}\,\frac{\frac{1}{2}\log_{10} 2}{32.2 \times 43429} = \frac{D}{92\ 7925\ r} \qquad (5)$$

Let $L_{7/8}$, $L_{3/4}$, $L_{5/8}$, $L_{1/2}$, $L_{3/8}$, $L_{1/4}$, $L_{1/8}$ be respectively the distance a vessel going 7/8 speed, 3/4 speed, 5/8 speed, 1/2 speed, 3/8 speed, 1/4 speed and 1/8 speed can be stopped from the instant the engines are going full speed astern and the resistance be as the square of the speed.

Again assume $R = rV_1^2$ where V_1 = Full speed, since V_1 equals Unity under the assumption where we use $L_{3/4}$, $L_{1/2}$, $L_{1/4}$ etc respectively $R = r \times (1)$ which makes $R = r$

Where $L_{3/4}$ = the distance run from 3/4 speed, in equation (2) we insert $V_{3/4} = 3/4$ for $V_1 = 1$, $r = R$ and $V = 0$

$$L_{3/4} = \frac{D}{gr\log_{10}e}\log_{10}\left(\frac{r(3/4)^2 + r}{r}\right)^{\frac{1}{2}}$$

$$L_{3/4} = \frac{D}{gr\log_{10}e}\log_{10}\left(\frac{9}{16} + 1\right)^{\frac{1}{2}}$$

$$L_{3/4} = \frac{D}{r}\,\frac{\log_{10}(\frac{25}{16})^{\frac{1}{2}}}{32\ 2 \times 43429} = \frac{D}{144\ 12\ r} \qquad (6)$$

In the table SHEET 1 will be found all of the formulas covering the entire range all figured in the same way The D/r being termed the permanent numbers and the variable designated as "M".

If we change and assume that the power used in reverse is only 2/3 of that going ahead which is quite common in turbines the retarding force due to the propeller instead of being = rV_1^2 becomes $R = 2/3\,rV_1^2$ and substituting in formula (3)

$$L = \frac{D}{gr\log_{10}e}\log_{10}\left(\frac{rV_1^2}{2/3\,rV_1^2} + 1\right)^{\frac{1}{2}}$$

$$L = \frac{D}{gr\log_{10}e}\log_{10}\left(\frac{3}{2} + 1\right)^{\frac{1}{2}} = \frac{D}{70\ 1949\ r} \qquad (5)\ \tfrac{2}{3}\text{ power}$$

To get the intermediate points of the curve we substitute in equation (2) $2/3\,rV_1^2 = R$ Let $V = 0$ and for $V_1^2 = 1$ put $V_{\frac{1}{2}}^2 = (1/2)^2$ Equation (2) then becomes

$$L_{1/2} = \frac{D}{gr\log_{10}e}\log_{10}\left(\frac{rV_{1/2}^2 + 2/3\,rV_1^2}{rV_0^2 + 2/3\,rV_1^2}\right)^{\frac{1}{2}}$$

$$L_{1/2} = \frac{D}{gr\log_{10}e}\log_{10}\left(\frac{r(1/2)^2 + 2/3\,r(1)^2}{2/3\,r(1)^2}\right)^{\frac{1}{2}}$$

$$L_{1/2} = \frac{D}{gr\log_{10}e}\log_{10}\left(\frac{1/4}{2/3} + 1\right)^{\frac{1}{2}} = \frac{D}{201.972\ r} \qquad (7)\ \tfrac{2}{3}\text{ power}$$

Using 2/3 power backing the remainder of the equations will be found in SHEET 1

If we assume that the power in reverse is only .53 of that going ahead the retarding force due to the propeller instead of being rV_1^2 becomes $R = .53\,rV_1^2$ and substituting in formula (3)

$$L = \frac{D}{gr\log_{10}e}\log_{10}\left(\frac{rV_1^2}{.53\,rV_1^2} + 1\right)^{\frac{1}{2}}$$

$$L = \frac{D}{gr\log_{10}e}\log_{10}(1\ 88679 + 1)^{\frac{1}{2}}$$

$$L = \frac{D}{r}\,\frac{.2302084}{13.966667} = \frac{D}{60\ 6697\ r} \qquad (5)\ .53\text{ power}$$

To get the intermediate points on the curve we substitute in equation (2) $.53\,rV_1^2 = R$, $V = 0$ and for $V_1^2 = 1^2$ put $V_{1/2}^2 = (1/2)^2$ Equatioo (2) then becomes

$$L_{1/2} = \frac{D}{gr\log_{10}e}\log_{10}\left(\frac{rV_{1/2}^2 + 53\,rV_1^2}{rV_0^2 + .53\,rV_1^2}\right)^{\frac{1}{2}}$$

and since $V = 0$ when the ship comes to rest

$$L_{1/2} = \frac{D}{gr\log_{10}e}\log_{10}\left(\frac{r(1/2)^2 + .53\,r(1)^2}{.53\,r(1)^2}\right)^{\frac{1}{2}}$$

$$L_{1/2} = \frac{D}{gr\log_{10}e}\log_{10}\left(\frac{.78}{.53}\right)^{\frac{1}{2}} = \frac{D}{186.4494\ r} \qquad (7)\ 53\text{ power}$$

Similarly using .53 power for backing the remainder of the equations are found in SHEET 1.

When the power for reversing is only 40% or 2/5 of that going ahead as in the case of some turbine vessels the retarding force due to the propeller instead of being = rV_1^2 becomes $R = 2/5\,rV_1^2$ and substituting in formula (3)

$$L = \frac{D}{gr\log_{10}e}\log_{10}\left(\frac{rV_1^2}{2/5\,rV_1^2} + 1\right)^{\frac{1}{2}}$$

$$L = \frac{D}{gr\log_{10}e}\log_{10}\left(\frac{5}{2} + 1\right)^{\frac{1}{2}} = \frac{D}{51\ 3416\ r} \qquad (5)\ 40\%\text{ power}$$

To get the intermediate points of the curve substitute in equation (2) $4\,rV_1^2 = R$ Let $V = 0$ and for $V_1^2 = 1$ put $V_{1/2}^2 = (1/2)^2$ Equation (2) then becomes

$$L_{1/2} = \frac{D}{gr\log_{10}e}\log_{10}\left(\frac{rV_{1/2}^2 + .4\,rV_1^2}{rV_0^2 + .4\,rV_1^2}\right)^{\frac{1}{2}}$$

$$L_{1/2} = \frac{D}{gr\log_{10}e}\log_{10}\left(\frac{r(1/2)^2 + .4\,r(1)^2}{.4\,r(1)}\right)^{\frac{1}{2}}$$

$$L_{1/2} = \frac{D}{gr\log_{10}e}\log_{10}(1.625)^{\frac{1}{2}} = \frac{D}{132.4775\ r} \qquad (7)\ 40\%\text{ power}$$

Using 40% power backing the remainder of the formulas will be found in SHEET 1.

To determine how far a vessel will go after the engines are stopped but not reversed, the problem must be considered from two angles, first, the resistance of the hull alone and second, what effect the propeller has acting as an obstruction

In the first case the resistance is that of the hull itself and $\therefore$ $R = 0$ If x_1 = the distance run before coming to rest equation (2) becomes

$$x_1 = \frac{D}{gr\log_{10}e}\log_{10}\frac{V_1}{V} \qquad (20)$$

V cannot be written = 0 because $\log_{10}\frac{V_1}{V} = \infty$ which is impossible because the vessel will come to rest eventually. An appropriate value can be obtained by letting V reduce to a small number and neglect the remaining energy If V = one foot per second, approximately .59 of a knot per hour; $\log_{10}\frac{V_1}{V} = \log_{10}V_1$ = the logarithm of the full speed of the vessel Similarly if V = .1 of a foot per second the result becomes the logarithm of 10 times the speed of the vessel

If we divide equation (20) by equation (4)

$$\frac{x_1 = \frac{D}{gr\log_{10}e}\log_{10}\frac{V_1}{V}}{L = \frac{D}{gr\log_{10}e}\log_{10}(2)^{\frac{1}{2}}} = \frac{\log_{10}\frac{V_1}{V}}{1/2\log_{10}2}$$

$$x_1 = \frac{L}{.150515}\log_{10}\frac{V_1}{V} = 6.6\,L\log_{10}\frac{V_1}{V} \qquad (21)$$

Formula (21) shows that a relationship exists between the distance to stop with and without the propeller assisting to bring the ship to rest and that is about all Attempts to enlarge on the usefulness of it proved to be unsatisfactory. However, it did point the way for the development shown in the paper on Intermittent Deceleration

To determine the time that will elapse (a vessel going full speed ahead) after the engines are turning full speed astern before the vessel will come to rest or be just on the point of going backwards.

In addition to the previous notation, let

t = the time in seconds that has elapsed from when the engines were going full speed astern until the velocity has been reduced to V

T = time in seconds that has elapsed from the instant when the engines were going astern until the vessel comes to rest or is just at the point of going backward.

The resistance retarding the vessel when the velocity is V will be

$$P = -(R + rV^2) \qquad \text{(31) same as (1)}$$

Again dividing both sides by (M) the Mass

$$\frac{P}{M} = -\frac{g}{D}(R + rV^2) = \frac{dV}{dt}$$

Taking out the increment of time

$$dt = -\frac{D}{g}\left(\frac{dV}{R + rV^2}\right) = -\frac{D}{gr}\left(\frac{dV}{\frac{R}{r} + V^2}\right) \qquad (33)$$

The integration of (dt) gives (t) which is sought

$$t = \frac{D}{g}\,\frac{1}{r}\int_{V_t}^{V_1}\frac{dV}{\frac{R}{r} + V^2} \qquad (34)$$

$$\text{From} \int\frac{dx}{a + bx^2} = \frac{1}{b}\int\frac{dx}{\frac{a}{b} + x^2} =$$

$$\frac{1}{b}\,\frac{1}{\sqrt{\frac{a}{b}}}\tan^{-1}\frac{x}{\sqrt{\frac{a}{b}}} = \frac{1}{\sqrt{ab}}\tan^{-1}\left(x\sqrt{\frac{b}{a}}\right)$$

Let $a = R \quad b = r \quad x = V$

$$t = \frac{D}{g}\,\frac{1}{R^{\frac{1}{2}}\,r^{\frac{1}{2}}}\left[\tan^{-1}\left(\frac{r^{\frac{1}{2}}}{R^{\frac{1}{2}}}V\right)\right]_{V_t}^{V_1}$$

$$t = \frac{D}{r^{\frac{1}{2}}\,g\,R^{\frac{1}{2}}}\left[\tan^{-1}\left(\frac{r^{\frac{1}{2}}}{R^{\frac{1}{2}}}V_1\right) - \tan^{-1}\left(\frac{r^{\frac{1}{2}}}{R^{\frac{1}{2}}}V_t\right)\right] \qquad (35)$$

When $V_1 = 0$ that is when the vessel is just on the point of going backwards

$$T = \frac{D}{r^{\frac{1}{2}}\,g\,R^{\frac{1}{2}}}\tan^{-1}\left(\frac{r^{\frac{1}{2}}}{R^{\frac{1}{2}}}V_1\right) \qquad (36)$$

Remembering that where $y = \tan^{-1} x$ (y) is the angle of which (x) = the tangent and also the assumption that $R = rV_1^2$ $R^{\frac{1}{2}} = r^{\frac{1}{2}}V_1$ and T = the time to stop from full speed

$$\tan^{-1}\left(\frac{r^{\frac{1}{2}}}{R^{\frac{1}{2}}}V_1\right) = \tan^{-1}\left(\frac{r^{\frac{1}{2}}V_1}{r^{\frac{1}{2}}V_1}\right) = \tan^{-1} 1$$

The angle in radians of which the tangent is (1) is 45 degrees or $\frac{\pi}{4}$ $\pi = 3\ 1416$ $\frac{\pi}{4} = .7854$

$$\text{also} \quad \frac{D}{g\,r^{\frac{1}{2}}\,R^{\frac{1}{2}}} = \frac{D}{g\,r^{\frac{1}{2}}\,r^{\frac{1}{2}}\,V_1} = \frac{D}{rgV_1}$$

$$T = \frac{D}{rgV_1}.7854 = \frac{D}{40.9467\,rV_1} \qquad (37)$$

Where $T_{7/8}$ $T_{3/4}$ $T_{5/8}$ $T_{1/2}$ $T_{3/8}$ $T_{1/4}$ $T_{1/8}$ represent the times from 7/8 speed, 3/4 speed, 5/8 speed, 1/2 speed, etc., to the point where the ship just starts to back, substitute in formula (36) $R = rV_1^2$ $R^{\frac{1}{2}} = r^{\frac{1}{2}}V_1$ so that formula (36) becomes

$$T = \frac{D}{rgV_1}\tan^{-1}\left(\frac{r^{\frac{1}{2}}V_1}{r^{\frac{1}{2}}V_1}\right) \qquad (38)$$

If the speed $V_{3/4}$ = 3/4 of the speed V_1 or full speed the time $T_{3/4}$ is found by substituting

$$\frac{V_{3/4}}{V_1} = \frac{3/4}{1} \quad \text{for} \quad \frac{V_1}{V_1} \quad \text{and formula (38) becomes}$$

$$T_{3/4} = \frac{D}{rgV_1}\tan^{-1}\left(\frac{3}{4}\right) \qquad (39)$$

The angle whose tangent is 3/4 = .75 = 36° 52' 11 65"
The value in radians for this angle = .64353

$$T_{3/4} = \frac{D}{rgV_1}.64353 \qquad (40)$$

Combining the constants $\frac{.64353}{g}$ formula (40) becomes

$$T_{3/4} = \frac{D}{49\ 9735\,rV_1} \qquad (41)$$

The remainder of the equations are found on SHEET 1

$\frac{D}{rV_1}$ being termed the permanent numbers and the variable designated as "K".

If we assume that only 2/3 of the power is used in backing $R = 2/3\,rV_1^2$ $R^{\frac{1}{2}} = (2/3)^{\frac{1}{2}}r^{\frac{1}{2}}V_1$ and substituting in formula (36) it becomes

$$T = \frac{D}{r^{\frac{1}{2}}g\,(2/3)^{\frac{1}{2}}r^{\frac{1}{2}}V_1}\tan^{-1}\left(\frac{r^{\frac{1}{2}}V_1}{(2/3)^{\frac{1}{2}}\,r^{\frac{1}{2}}\,V_1}\right)$$

$$T = \frac{D}{rgV_1\,(2/3)^{\frac{1}{2}}}\tan^{-1}(1\ 224740)$$

The angle whose tangent is 1 224740 is 50° 46' and the circular arc in radians of this angle = .88607 Combining the constants the formula becomes

$$T = \frac{D}{29.6343\,rV_1} \quad \text{which is formula (37) using 2/3}$$

power for backing

If we substitute in formula (36) $V_{7/8} = 7/8$ $V_{3/4} = 3/4$ etc for $V_1 = 1$ keeping $R = 2/3\,rV_1^2$ and $R^{\frac{1}{2}} = (2/3)^{\frac{1}{2}}\,r^{\frac{1}{2}}V_1$ it becomes

$$T_{7/8} = \frac{D}{rV_1\,26\ 29}\tan^{-1}\left(\frac{r^{\frac{1}{2}}\,V_{7/8}}{(2/3)^{\frac{1}{2}}\,r^{\frac{1}{2}}\,V_1}\right)$$

Since $V_{7/8} = 7/8$ and $V_1 = 1$

$$T_{7/8} = \frac{D}{rV_1\,26\ 29}\tan^{-1}\left(\frac{7/8}{(2/3)^{\frac{1}{2}}}\right)$$

7/8 divided by $(2/3)^{\frac{1}{2}}$ = 1 07165 The angle whose tangent is 1 07165 = 46° 58' 51.2" and the circular arc of this angle is .81997 radian Combining the constants

$$T_{7/8} = \frac{D}{32.0232\,rV_1} \quad \text{which is formula (44) using 2/3}$$

of full power for backing. See SHEET 1 for the remainder of the time formulas for (2/3) power backing.

If we assume that the power used for reversing is only .53 of that going ahead the retarding force due to the propeller instead of being rV_1^2 becomes $R = .53\,rV_1^2$ and substituting in formula (36) it becomes

$$T = \frac{D}{r^{\frac{1}{2}}g(.53)^{\frac{1}{2}}\,r^{\frac{1}{2}}V_1}\tan^{-1}\left(\frac{r^{\frac{1}{2}}V_1}{(.53)^{\frac{1}{2}}\,r^{\frac{1}{2}}V_1}\right)$$

$$T = \frac{D}{rgV_1\,(.53)^{\frac{1}{2}}}\tan^{-1}\left(\frac{1}{(.53)^{\frac{1}{2}}}\right)$$

The reciprocal of $(.53)^{\frac{1}{2}}$ = 1.373605 The angle whose tangent is 1 3736 = 53° 58' 41 9" and the circular arc of this angle = .94151737 Combining the constants

$$= \frac{D}{24\ 8667\,rV_1} \quad \text{which is formula (37) using .53}$$

power for reversing.

If we substitute in formula (36) $V_{7/8} = 7/8$ $V_{3/4}$ = 3/4 etc for $V_1 = 1$ keeping $R = .53\,rV_1^2$ formula (36) becomes

$$T_{7/8} = \frac{D}{rV_1\,23.412}\tan^{-1}\left(\frac{r^{\frac{1}{2}}V_{7/8}}{(.53)^{\frac{1}{2}}\,r^{\frac{1}{2}}V_1}\right)$$

$$T_{7/8} = \frac{D}{rV_1\,23\ 412}\tan^{-1}\left(\frac{7/8}{(.53)^{\frac{1}{2}}}\right)$$

7/8 divided by $(.53)^{\frac{1}{2}}$ = 1 202 The angle whose tangent is 1 202 = 50° 14' 20 84" and the circular arc for this angle is .8770 Combining the constants

$$T_{7/8} = \frac{D}{26\ 70091\,rV_1} \quad \text{which is formula (44) using}$$

.53 power for backing. The remainder of the formulas using .53 power for backing are found in SHEET 1.

To determine the time that will elapse after the engines are put full astern assuming that the power used for backing is only 40% of that going ahead the retarding force due to the propeller instead of being rV_1^2 becomes $R = .4\,rV_1^2$ and substituting in formula (36) it becomes

$$T = \frac{D}{r^{\frac{1}{2}}g(.4)^{\frac{1}{2}}\,r^{\frac{1}{2}}V_1}\tan^{-1}\left(\frac{r^{\frac{1}{2}}\,V_1}{(.4)^{\frac{1}{2}}\,r^{\frac{1}{2}}\,V_1}\right)$$

$$T = \frac{D}{rgV_1\,(.4)^{\frac{1}{2}}}\tan^{-1}\left(\frac{1}{(.4)^{\frac{1}{2}}}\right)$$

The reciprocal of $(.4)^{\frac{1}{2}}$ = 1 58114 and the angle whose tangent is 1.58114 = 57° 41' 18 46" and the circular arc of this angle = 1 00685359 Combining the constants

$$T = \frac{D}{20.201\,rV_1} \quad \text{which is formula (37) using 40\%}$$

power for backing.

If we substitute in formula (36) $V_{7/8} = 7/8$ $V_{3/4} = 3/4$ etc. for $V_1 = 1$ keeping $R = .4\,rV_1^2$ formula (36) becomes

$$T_{7/8} = \frac{D}{rV_1\,20.3394}\tan^{-1}\left(\frac{r^{\frac{1}{2}}\,V_{7/8}}{(.4)^{\frac{1}{2}}\,r^{\frac{1}{2}}\,V_1}\right)$$

$$T_{7/8} = \frac{D}{rV_1\,20.3394}\tan^{-1}\left(\frac{7/8}{(.4)^{\frac{1}{2}}}\right)$$

7/8 divided by $(.4)^{\frac{1}{2}}$ = 1.38351 The angle whose tangent is 1.38351 = 54° 8' 25.3" and the circular arc for this angle is .94493 Combining the constants

$$T_{7/8} = \frac{D}{21\ 5248\,rV_1} \quad \text{which is formula (44) for 40\%}$$

power backing. The remainder of the formulas are found on SHEET 1.

The time required for the vessel to come to rest with the engines stopped only is discussed in the paper on Intermittent Deceleration

David W Dickie

Editorial Note

The author of these articles on Acceleration and Deceleration of ships is in much demand as an expert consultant in admiralty cases.

During his long experience as a naval architect and as a careful observer of maritime phenomena he has acquired considerable data on collisions.

These articles summarize and record the conclusions based on that data and should be of great value to younger naval architects and to navigation officers aboard ship.

These results of experience and analysis have been tested in many marine insurance and general admiralty cases and have uniformly approved themselves as correct. They are here turned loose for anyone who has the intelligence necessary for their application.

The series of articles, to which these mathematical derivations are appendices, was published in the Pacific Marine Review issues of February, March and April, 1939, under the heading, "Deceleration, Acceleration and Intermittent Deceleration of Ships."

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APPENDIX B.

ACCELERATION.

In the case of a vessel backing away from the wharf or pier, that is, accelerating from rest, the resistance of the vessel is rV^2 as in the case of Deceleration which is being overcome by the force (R) of the propeller so the force (P) in pounds is

$$P = (R - rV^2) \qquad (51)$$

$\therefore$ the increase in acceleration of the vessel would be

$$\frac{\text{Force} = P}{\text{Mass} = M} = \frac{g}{D}(R - rV^2) = \frac{dV}{dt} \text{ since acceleration} = \frac{dV}{dt}$$

as before $x = f(t)$ $V_x = \frac{dx}{dt}$ so $\frac{1}{dt} = \frac{V_x}{dx}$

$$\frac{P}{M} = \frac{g}{D}(R - rV_x^2) = \frac{dV}{dt} = \frac{V_x dV}{dx}$$

$$\therefore \; dx = \frac{D}{g}\left(\frac{V_x dV}{R - rV_x^2}\right)$$

To find the distance traveled (x) integrate this expression between the limits of V_1 and V

$$x = \int_V^{V_1} \frac{D}{g}\left(\frac{V_x dV}{R - rV_x^2}\right)$$

Let $u = R - rV_x^2$ $du = 0 - r2V_x dV$ $\frac{du}{2r} = -V_x dV$

$$x = \frac{D}{g}\int_V^{V_1}(R - rV_x^2)^{-1}V_x dV = \frac{D}{g}\int_V^{V_1} -\frac{1}{2r}u^{-1}du$$

$$x = -\frac{D}{2gr}\int_V^{V_1}u^{-1}du = -\frac{D}{2gr}\ln u$$

$$x = -\frac{D}{gr}\ln u^{\frac{1}{2}} = -\left[\frac{D}{gr}\ln(R - rV_x^2)^{\frac{1}{2}}\right]_V^{V_1}$$

$$\text{when } V_x = V_1 \quad x = \frac{D}{gr}\ln(R - rV_1^2)^{\frac{1}{2}}$$

$$\text{when } V_x = V \quad x = \frac{D}{gr}\ln(R - rV^2)^{\frac{1}{2}}$$

$$\text{subtracting, } x = -\frac{D}{gr}\left[\ln(R - rV_1^2)^{\frac{1}{2}} - \ln(R - rV^2)^{\frac{1}{2}}\right]$$

$$x = -\frac{D}{gr}\ln\left(\frac{R - rV_1^2}{R - rV^2}\right)^{\frac{1}{2}}$$

When the vessel is up to full speed $x = L$ and when the vessel started from rest $V = 0$ Changing to common logarithms to the base 10

$$x = -\frac{D}{gr\log_{10}e}\log_{10}\left(\frac{R - rV_1^2}{R - rV^2}\right)^{\frac{1}{2}}$$

$$L = -\frac{D}{gr\log_{10}e}\log_{10}\left(\frac{R - rV_1^2}{R - 0}\right)^{\frac{1}{2}}$$

$$L = -\frac{D}{gr\log_{10}e}\log_{10}\left(1 - \frac{rV_1^2}{R}\right)^{\frac{1}{2}}$$

If we assume that (R) = the force of the propeller = rV_1^2 as that required to propel the vessel at full speed

$$L = -\frac{D}{gr\log_{10}e}\log_{10}(1 - 1)^{\frac{1}{2}}$$

$$L = -\frac{D}{gr\log_{10}e}\log_{10}(0)^{\frac{1}{2}} \qquad (54)$$

$$L = -\frac{D}{r}\;\frac{1/2\log_{10}(0)}{32.2 \times .4343}$$

Since the $\log_{10}$ of (0) = − Infinity L = Infinity (55)

L = the total distance traveled before attaining full speed is therefore Infinity. Actually the speed attained on trial remains a little short of full speed theoretically.

Let $L_{1/8}$ $L_{1/4}$ $L_{3/8}$ $L_{1/2}$ $L_{5/8}$ $L_{3/4}$ and $L_{7/8}$ respectively be the distances a vessel backing from rest will have traveled when she has attained 1/8 speed 1/4 speed 3/8 speed 1/2 speed 5/8 speed 3/4 speed and 7/8 speed respectively the engines assumed to be turning Full Speed Astern all the while If the vessel is starting from rest bow first the only difference will be in the efficiency factor to be used in connetion with the derivation of the factor (r).

Again assume $R = rV_1^2$ where V_1 = Full Speed Since V_1 = Unity under the assumption where we use $L_{1/8}$ $L_{1/4}$ $L_{3/8}$ etc. respectively, $R = r \times (1)^2$ which makes $R = r$

Where $L_{1/8}$ = the distance traveled when 1/8 speed is attained, in equation (52) we insert $V_{1/8} = 1/8$ for $V_1 = 1$ $r = R$ and $V = 0$

$$L_{1/8} = -\frac{D}{gr\log_{10}e}\log_{10}\left(\frac{r - r(1/8)^2}{r}\right)^{\frac{1}{2}}$$

$$L_{1/8} = -\frac{D}{gr\log_{10}e}\log_{10}(1 - 1/64)^{\frac{1}{2}}$$

$$L_{1/8} = -\frac{D}{r}\;\frac{1/2\log_{10}(63/64)}{32\ 2 \times .4343}$$

$$L_{1/8} = -\frac{D}{r}\;\frac{1/2 \times (9.9931605 - 10)}{32.2 \times .4343}$$

$$L_{1/8} = \frac{D}{4084\ 12\ r} \qquad (62)$$

The remainder of the equations are found in SHEET

If we change and assume that the power in reverse is only 2/3 of that going ahead which is common in turbines the accelerating force due to the propeller in backing from the wharf instead of being $R = rV_1^2$ becomes $R = 2/3\,rV_1^2$ and substituting in formula (53)

$$L = -\frac{D}{gr\log_{10}e}\log_{10}\left(1 - \frac{rV_1^2}{2/3\,rV_1^2}\right)^{\frac{1}{2}}$$

$$L = -\frac{D}{gr\log_{10}e}\log_{10}\left(1 - \frac{3}{2}\right)^{\frac{1}{2}}$$

$$L = -\frac{D}{gr\log_{10}e}\log_{10}(-1/2)^{\frac{1}{2}}$$

As a logarithm must be a positive number all this proves is that we cannot attain full speed in any distance at all with only 2/3 power. Therefore we must go back to the speed and horsepower curve, find the proper speed for 2/3 power, calculate the factors and plot new curves assuming that 2/3 power is full power under the circumstances. The new $\frac{D}{r}$ and $\frac{D}{rV_1}$ must be used as found for 2/3 power at the corresponding speed for 2/3 power. In the case where the horsepower for a speed below the lower limits of the Morton and Goudie Computer is desired for a "Very Slow Ahead" calculation, care must be taken to get the proper form of the horsepower curve.

To determine the time to accelerate the vessel from rest to full speed. In addition to the previous notation

Let t = time in seconds that has elapsed from when the engines were started from rest until the velocity of the vessel has been brought up to speed V.

T = time in seconds that has elapsed from the instant when the engines were started astern until the vessel has attained full speed V_1

The resistance of the vessel as before is rV^2 which is being overcome by the force R of the propeller so the force P in pounds

$P = (R - rV^2)$ Dividing both sides by the Mass

$$\frac{\text{Force} = P}{\text{Mass} = M} = \frac{g}{D}(R - rV^2) = \frac{dV}{dt} = \text{Acceleration}$$

Taking out the increment of time

$$dt = \frac{D}{g}\left(\frac{dV}{R - rV^2}\right)$$

The integration of (dt) gives (t) which is sought

$$t = \frac{D}{g}\int_{V_t}^{V_1}\frac{dV}{R - rV^2}$$

$$\text{From } \int\frac{dx}{a - bx^2} = \frac{1}{\sqrt{ab}}\tanh^{-1}\left(x\sqrt{\frac{b}{a}}\right)$$

Let $a = R$ $b = r$ $x = V$ and $dx = dV$

Substituting the proper values

$$t = \frac{D}{g}\;\frac{1}{R^{\frac{1}{2}}r^{\frac{1}{2}}}\left[\tanh^{-1}\left(\frac{r^{\frac{1}{2}}}{R^{\frac{1}{2}}}V\right)\right]_{V_t}^{V_1}$$

$$= \frac{D}{r^{\frac{1}{2}}gR^{\frac{1}{2}}}\left[\tanh^{-1}\left(\frac{r^{\frac{1}{2}}}{R^{\frac{1}{2}}}V_1\right) - \tanh^{-1}\left(\frac{r^{\frac{1}{2}}}{R^{\frac{1}{2}}}V_t\right)\right]$$

When $V_t = 0$ that is when the vessel is starting from rest

$$T = \frac{D}{r^{\frac{1}{2}}gR^{\frac{1}{2}}}\left[\tanh^{-1}\left(\frac{r^{\frac{1}{2}}}{R^{\frac{1}{2}}}V_1\right)\right] \qquad (67)$$

Since ($\tanh^{-1} y$) is the number (u) whose hyperbolic tangent is (y) or (tanh u) = (y) and by assumption $R = rV_1^2$ $R^{\frac{1}{2}} = r^{\frac{1}{2}}V_1$ and (T) = the time to attain full speed

$$\tanh^{-1}\left(\frac{r^{\frac{1}{2}}}{R^{\frac{1}{2}}}V_1\right) = \tanh^{-1}\left(\frac{r^{\frac{1}{2}}V_1}{r^{\frac{1}{2}}V_1}\right) = \tanh^{-1}(1)$$

$$\text{also } \frac{D}{r^{\frac{1}{2}}gR^{\frac{1}{2}}} = \frac{D}{r^{\frac{1}{2}}gr^{\frac{1}{2}}V_1} = \frac{D}{rgV_1}$$

$$\therefore \; T = \frac{D}{rgV_1}\tanh^{-1}(1)$$

$\tanh^{-1}(1)$ is the number (u) whose hyperbolic tangent is (1) or tanh u = 1

Also since $\tanh^{-1}(a) = \frac{1}{2}\log_e\left(\frac{1+a}{1-a}\right)$ and (a) = 1

$$\tanh^{-1}(1) = \frac{1}{2}\log_e\left(\frac{1+1}{1-1}\right) = \frac{1}{2}\log_e\left(\frac{2}{0}\right)$$

$= \frac{1}{2}\log_e(\infty)$ Since $\log_e(\infty) = \infty$

$$\therefore \; T = \frac{D}{grV_1}\infty = \text{Infinity} \qquad (68)$$

which is the time to accelerate from rest to full speed

Where $T_{7/8}$ $T_{3/4}$ $T_{5/8}$ $T_{1/2}$ $T_{3/8}$ $T_{1/4}$ and $T_{1/8}$ represent the times from (0) to the point where the ship has attained 7/8 speed, 3/4 speed, 5/8 speed, etc, substitute in formula (67) $R = rV_1$ $R^{\frac{1}{2}} = r^{\frac{1}{2}}V_1$ so that formula (67) becomes

$$T = \frac{D}{r^{\frac{1}{2}}gR^{\frac{1}{2}}}\tanh^{-1}\left(\frac{r^{\frac{1}{2}}V_1}{r^{\frac{1}{2}}V_1}\right) \qquad (69)$$

If the speed $V_{3/4}$ = 3/4 of the speed V_1 or Full Speed the time $T_{3/4}$ is found by inserting

$\frac{V_{3/4}}{V_1} = \frac{3/4}{1}$ for $\frac{V_1}{V_1}$ and formula (69) becomes

$$T_{3/4} = \frac{D}{rgV_1}\tanh^{-1}(3/4)$$

$\tanh^{-1}(3/4)$ is the number (u) whose hyperbolic tangent is (3/4) or tanh u = 3/4 From a table of hyperbolic functions where tanh u = .75002 u = .973

$\therefore \; T_{3/4} = \frac{D}{rgV_1} \times .973$ Combining the constants

$$T_{3/4} = \frac{D}{33.0536\,r\,V_1} \qquad (70)$$

The remainder of the formulas are found in SHEET ONE. Two extra formulas have been introduced at the top of the curve to take care of the wide space between the results there.

It will be seen by examining $L_{1/8}$ and $T_{1/8}$ for the two conditions "Decelerating" and "Accelerating" that within the limits of "Zero to 1/8th speed" the two curves are practically identical but beyond 1/8th speed the curves separate rapidly and it is necessary to plot both conditions to get a true comparison of the times and distances.

On the Ways—

SHIPS IN THE MAKING

LATEST NEWS FROM AMERICAN SHIPYARDS

Plans and Specifications For C-1 Cargo Vessels

The most important June event for Pacific Coast shipbuilders was the issuance on the 2nd day of the month of plans and specifications for the C-1 standard cargo vessels by the U. S. Maritime Commission. Bids were called for to be opened on July 11. Four alternatives are requested, as follows:

(1) A full shelter deck type of hull with geared steam turbine propulsion;

(2) A full shelter deck type of hull with diesel propulsion;

(3) A full scantling 3 island type with geared steam turbine propulsion; and

(4) A full scantling 3 island type with diesel propulsion.

The latter type of hull is a little longer than the former. In general they are all single screw built of steel with raked stem and cruiser stern, have 4,000 shaft horsepower, a sea speed of 14.5 knots, accommodations for 8 passengers and a crew of 42.

The overall length is 413 feet, beam 60 feet, depth molded to shelter deck 37 feet 6 inches, gross measurement approximately 5028 tons, and net measurement approximately 2820 tons.

It is understood that all the established Pacific Coast yards are bidding and that there has been a revival of some old yards that have long been hibernating.

The Todd Seattle Dry Docks Inc. are bidding and if successful will rehabilitate the old Todd yard at Tacoma, build the hulls there, and then equip them at the Seattle plant.

On San Francisco Bay four yards are said to be bidding strongly. These are:

The Moore Dry Dock Company;

The Union Yard of the Shipbuilding Division of the Bethlehem Steel Co.;

The General Engineering & Dry Dock Co.: and

The Western Pipe and Steel Company at their South San Francisco yard (old Shaw-Batcher).

At Los Angeles the Consolidated Steel Corporation Ltd. and the Los Angeles Shipbuilding and Dry Dock Company are bidding. The former do not own a shipyard but have arranged with the Craig yard at Long Beach for the use of that yard as an assembling plant for shipbuilding steel fabricated at their Maywood shops.

Twenty C-1's are to be built as a result of this bidding and it is reported that awards will be limited to four ships for each of the four low bidders. On this basis at least two of the Pacific Coast yards should get some of this work.

Sun Launching One C-2 a Month

The Sun Shipbuilding and Dry Dock Company is putting a C-2 into the water practically every thirty days. On April 22 the Donald McKay was launched. (For description see page 33, this issue.)

On May 18 the Mormachawk was launched. Miss Mollie Foulkes Lee, fifteen-year-old daughter of Comm. Robert C. Lee, executive president of the Moore-McCormack Lines, Inc., acting as sponsor.

On June 15 Miss Barbara Ann Moore, fourteen-year-old daughter of A. V. Moore, president of the Moore-McCormack Lines Inc., christened another C-2, Mormacwren.

There are 6 of these C-2 motorships, with a 6,000 shaft horsepower main propulsion diesel engine in each ship. The other three will be launched in July, August and September and will be christened Mormacgull, Mormacdove, and Mormaclark.

It is reported that the new owners will change Donald McKay to a "Mormac" designation.

These vessels will all operate in the Scantic American Line services to Baltic ports.

Diesel Drive Cargo Vessel Ordered

The Erie & St. Lawrence Corporation has given a contract to the Charleston Shipbuilding and Dry Dock Company, Charleston, S. C., to build a steel diesel engined twin screw cargo vessel. Designed by Gielow, she will be 290 feet long, 42 feet beam, 18 feet deep, of 4090 tons displacement, and 3256 tons total deadweight capacity. Her

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diesels will deliver 900 shaft horsepower.

An insured preferred ship mortgage in the amount of $225,000 has been issued, under Title XI of the Merchant Marine Act, for the construction of this vessel.

Texas To Build New Fast Tanker

The Texas Company has awarded a contract to the Sun Shipbuilding and Dry Dock Company for the construction of a tanker with these characteristics: length overall 490 feet, length between perpendiculars 465 feet, beam molded 65 feet, depth molded 34 feet 3 inches, draft loaded 28 feet, displacement 18,075 tons, gross measurement 8,569 tons, deadweight capacity 12,390 tons, shaft horsepower 4,000 developed by geared steam turbines.

Call for Bids

It is reported that George G. Sharp, naval architect, has issued a call for bids on the construction of a Great Lakes passenger vessel 300 feet long by 55 feet beam, arranged to accommodate 1,000 persons and 30 to 40 automobiles. She will be propelled by turbo-electric machinery developing 6,000 shaft horsepower which is expected to give her a speed of 23 miles an hour. She will incorporate all the safety features demanded in a vessel of this class and for which her designer is famous.

Navy Awards in June

June 2 was a big day in U. S. Naval contracts. On that date the Navy made shipbuilding awards to private yards as follows:

Bath Iron Works, 2 destroyers; $4,813,000 each; $9,626,000.

Federal S. B. & D. D., 2 destroyers; $4,895,000 each; $9,790,000.

Electric Boat Company, 3 submarines; $2,937,000 each; $8,811,000.

Newport News S. B. & D. D. Co., 1 aircraft carrier; $31,800,000; $31,800,000.

Federal, 2 cruisers; $12,226,000 each; $24,452,000.

Bethlehem, 2 cruisers; $12,226,000 each; $24,452,000.

Total $108,931,000.

On the same day Navy yards were allotted an even greater value of ship construction work, as follows:

New York Navy Yard, one 45,000-ton battleship;

Philadelphia Navy Yard, one 45,000-ton battleship;

Boston Navy Yard, two destroyers;

Charleston Navy Yard, two destroyers;

Portsmouth Navy Yard, three submarines;

Mare Island Navy Yard, one submarine;

Puget Sound Navy Yard, two small seaplane tenders.

PACIFIC NORTHWEST MARINE REVIEW

By C. F. A. MANN

With increased activity on all parts of the Northwest maritime front, 1939 promises to be a banner year for the Pacific Northwest. The one sore spot has been the flareup over filling out a crew for the Coldbrook, first of the new Northwest Oriental Line ships to arrive to enter the Puget Sound Oriental service. The newly assigned vessel had hardly entered the Straits of Juan De Fuca when the row broke out between the Sailors' Union of the Pacific and the Maritime Commission over which method was to be used in rounding up crews for the new service. The union demanded that the crews be recruited from union hiring halls, while the Commission insisted that the crew be filled from lists of the U. S. Shipping Commissioner. Final peace parleys were held Friday, June 23, to untangle the technicalities involved. Meanwhile the Maritime Commission had threatened to withdraw the entire fleet of ships assigned to the new Northwest Orient Line unless the matter was settled by June 20.

● Todd's Bidding on New Shipbuilding

The Todd - Seattle organization was one of those submitting bids for a group of C-1 Maritime Commission ships, bids on which will be opened July 11. The Todd Northwest organization has plans all in readiness to reopen its Tacoma launching ways and build the hulls there, doing the machinery installation and finish work in Seattle. The C-1 ships are 413 x 60 ft., 5,000 gross ton ships of a type that can be economically turned out by the Northwest builders as they did during World War days. Unofficial spokesmen in the Northwest are saying their prayers loudly these days and hoping that the "dope" emanating from political sources at Washington, D. C., is correct when it says that the next batch of vessels to be awarded will go to Puget Sound.

● Fishboat Construction

The current year will be one of the all-time high record years in fishing vessel construction in the Northwest, in spite of gloomy predictions made last year when the boom looked like it would collapse.

Fishing vessel construction is becoming more standardized as to design of hull and equipment than ever before. The system of handling auxiliary power through chain drive from the main diesel engine and line shafting is being installed on practically 100% of the new boats.

Following is a digest of important construction in the Northwest:

● Trollers

Unique among this season's production was the fleet of some 14 trolling vessels completed by the Tacoma Boat Building Co., the first large order of its kind in 5 years. These vessels range from 38 to 52 feet in length and have quarters for from 3 to 8 men and enough power to give them 6 knots. Among the engines in this fleet we find: Chrysler, Gray, Emsco, Deutz, Gray-General Motors, Lorimers, Atlas and Budas ranging in size from 35 to 110 H.P.

An interesting ship turned out by Messrs. Strom & Dahl at Tacoma Boat Building Co. was the Vita J. for Oceanic Fisheries of Seattle. This big purse seiner is 78 x 20 x 10 ft. and has a 200 H.P. Atlas diesel and a 32 volt Exide storage battery system.

Busiest purse seiner building yard on the Pacific Coast is the Martinolich Shipbuilding Corp. of Tacoma. Most of the fleet built for Monterey, California, fisheries in the past two years has been turned out by this yard. This year they have tried with marked success the use of Super Harboard waterproof plywood for all interior paneling in crew's spaces on their ships. This has worked out unusually well, due to its strength, beauty, ease of application, and 100 per cent waterproof quality. The use of the Ets-Hokin and Galvan auto-

(Page 62, please)

Two Puget Sound built Monterey, California, owned purse seine fishing boats.

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STATIC ELECTRIC HAZARDS ON BOARD OIL TANKERS

By GEO. F. PRUSSING
Safety Engineer, Union Oil Company of California

When any liquid flows through pipes or hose or through the air from one vessel to another, static electricity is generated. This in itself is not dangerous unless it can accumulate on some object that is thoroughly insulated from the ground or from the vessel from which the liquid is being discharged. If the liquid is a conductor of electricity, such as water, there is little chance of accumulation. Petroleum being a non-conducting liquid does not permit the charges to escape through it. If accumulation takes place on an insulated object, such as a bucket or tank being filled, or even a bucket floating on the surface of a tank, this accumulation becomes hazardous in the presence of an explosive mixture when the accumulated static charge is allowed to jump as a spark to some other object.

On board ship, tanks are usually filled by means of pipes which enter the ship's tanks at or close to the bottom. Overall loading of materials which give off flammable vapors, that is, those which have a flash-point below 100 degrees, is forbidden. There is no possibility of accumulating a static charge as the result of loading a tankship when our rules are followed, since the ship's piping, the tank walls and the hull of the ship are metallically one, and the ship is resting in water, which perfectly grounds it.

In the case of the pipe on the wharf the static generated is not hazardous because the pipe is grounded either by resting on and through the earth or by means of attached bonding wires which are carried to salt water under the wharf. Hence the charges do not accumulate. In the case of the hose, accumulation of static can occur on hose couplings if they are not connected to the metallic reinforcing of the hose and thus bonded either to the ship or to the pipeline. Some use is made in the oil business of hose which carries no metal reinforcing and no bond wires and in cases of this sort a coupling supported between two lengths of hose is completely insulated and may accumulate a considerable charge of static electricity. This charge has been felt by men who have come in contact with couplings at a time that a spark is drawn from them, a fire may result. This type of hose should never be used at any time during the loading or discharging of Class A oils. The hazard may be eliminated by the use of bond wires in hose if the wire is properly connected to the nipple at each end.

No description of the static hazard is complete without pointing out the difference between it and the stray currents arising from power circuits on land or on the wharf which sometimes leak onto wharf piping and consequently are transmitted to the hose couplings through spiral lining or bond wire. The two following examples illustrate how this may occur.

1. When one of our ships was connected to the pipe stem on the Tacoma smelter wharf several years ago, a spark was seen to jump from the pipe flange to the hose flange. The hose was already connected to the ship's piping. Investigation revealed that the little electric railway used by the smelter was not properly protected against leakage of the return current through the rails and this current got into the piping on the wharf. This piping was not properly grounded. When the ship's hose was first made fast to the ship's piping, and then connected to the wharf piping, some of this current sparked across the two flanges seeking the ground through the ship. No fire resulted because the hose contained no flammable vapors. The cure for the situation was found by inserting an insulating flange in the pipeline near the hose connection. The remainder of the pipeline was then permanently grounded to salt water.

2. At one of our marine plants a power circuit running in conduit under ground failed and the conduit itself became charged with the current. The conduit was grounded by connection to wharf piping, consequently the wharf piping also became alive. Because the ground was

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dry sand, not enough current leaked off to cause the heavy fuses in the power circuit to blow out. When the tanker bond wire was next used, a flash occurred when the wire was thrown to the deck of the tanker. The wire had already been connected to the outlet on the wharf, which in turn was connected to the pipeline. This method of connecting the bond wire was in direct violation of company orders, which state that the connection shall first be made to the ship and then to the wharf receptacle, which is arc tight and consequently safe from sparks. In this case, however, sparks jumped from the end of the wire when it was thrown on the deck of the tanker, and had explosive vapors been present a fire would have resulted. Proper grounding of the wharf piping would have revealed the defect in the power circuit by blowing the fuses.

The use of a bonding cable between ship and shore is solely for the purpose of eliminating fires which may result from incidents such as those mentioned above. It has no function as a preventive of static, since both ship and piping are assumed to be properly grounded. There is no question but what the ships are always properly grounded, but since the short piping sometimes gets a charge of shore current the bond wire is used in order to assure that the piping is grounded through the ship before hoses are connected. It is obvious that the connection must first be made to the ship so that if a spark occurs it will be in the arc-tight receptacle on the wharf, where it can do no harm.

Shore accidents resulting from static are very few. At sea and on the waterfront they are almost unknown. The principal trouble resulting from this phenomenon is in refineries under conditions that do not prevail anywhere else in the oil business.

(Reprinted from May issue of Marine Safety)

American Cargo War Risk Reinsurance Exchange

On Saturday, June 10, 1939, the American Cargo War Risk Reinsurance Exchange began operations in offices at 99 John Street, New York City. As the name implies, the function of the organization is to provide war risk reinsurance on cargo written by companies in the American market. The primary purpose of the Exchange is to ensure the continuance of a self-sufficient American war risk market.

This step involves no change in the present method of underwriting cargo war risk insurance by the individual companies, and in no way affects the relations between the American importer or exporter and his insurance company. It does, however, enable every underwriter who is a member of the Exchange to be sure of obtaining adequate reinsurance and thus keep his net retained line, on any one risk, within reasonable limits. The Exchange also provides the underwriter with a wider spread or distribution of risks. The American cargo insurance market deemed it advisable to adopt this measure in view of the recurring crises in foreign affairs, and the steps taken by a number of foreign governments with respect to war risk insurance.

Membership in the Exchange is open to every company qualified to write cargo war risk insurance in this market. The affairs of the Exchange will be managed by a board of managers, 15 in number, with a rotating and limited tenure of office. The first board of managers elected by the Exchange are: H. Chubb, F. Maccabe, S. D. McComb, H. C. Thorn, and F. B. Zeller, for 3 years; J. T. Byrne, H. Jackson, H. E. Manee, F. B. McBride, and J. W. Morrow, for 2 years; and W. Betteridge, W. R. Hedge, J. C. Keegan, W. C. Spelman, and W. D. Winter, for 1 year. William D. Winter was elected chairman of the board of managers. The Exchange membership consists of more than 100 insurance companies, whose total capital and surplus in the United States as of December 31, 1938, amounted to approximately $1,000,000,000.

Observations From The Crow's Nest

"NAMES AND NEWS" ★ BY BERNARD De ROCHIE

Propeller Club of the United States

Charters New

Port of San Francisco

News of the formation of a Propeller Club of the United States in San Francisco has reached Pacific Marine Review as we are going to press with this edition.

C. H. A. Pearsall, national president, announces:

"For a number of years the American Merchant Marine Committee has been anxious to have a Propeller Club of the United States in San Francisco to join with our many other Ports in concerted effort on behalf of the American Merchant Marine.

"I am confident you will be greatly interested to learn of the chartering on June 3 of The Propeller Club of the United States, Port of San Francisco. This is Propeller Club Port No. 65. On behalf of the National Board of Governors of The Propeller Club of the United States, and the executive members of the American Merchant Marine Conference, I pledge to The Propeller Club, Port of San Francisco, our sincere offer of mutual assistance in the important problems affecting our shipping."

President of the Port of San Francisco organization is **Tirey L. Ford,** executive vice-president of Swayne & Hoyt, Ltd.

First vice-president, **Frazer Bailey,** executive vice-president of Matson Navigation Company. **Charles L. Wheeler,** executive vice-president of McCormick Steamship Co., is second vice-president. Third vice-president is **Joseph R. Sheehan,** president of American President Lines. Secretary-treasurer is **Eugene Hoffman** of the American President Lines.

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Matson Navigation Company
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Capt. Henry Blackstone
Marine Office of America
340 Pine St.

John E. Cushing
President
American-Hawaiian S.S. Co.
215 Market St.

Kenneth D. Dawson
Vice President
Panama Pacific Line
665 Market St.

Fred L. Doelker
Manager, Grace Line
2 Pine St.

Tirey L. Ford
Executive Vice President
Swayne & Hoyt, Ltd
215 Market St.

Hugh Gallagher
Operating Manager
Matson Navigation Co.
215 Market St.

A. S. Gunn
General Manager
Bethlehem Steel Co.
20th and Illinois Sts.

Edward H. Harms
Operating Manager
McCormick Steamship Co.
461 Market St.

George Jordan
Marine Secretary
Fireman's Fund Ins. Co.
401 California St.

Roger D. Lapham
Chairman of the Board
American-Hawaiian S.S. Co.
215 Market St.

Ira S. Lillick
Lillick, Olson, Levy & Geary
311 California St.

Joseph A. Moore
President, Moore Drydock Co.
351 California St.

Joseph R. Sheehan
President
American-President Lines
311 California St.

Charles L. Wheeler
Executive Vice President
McCormick Steamship Co.
461 Market St.

SECRETARY

Gene Hoffman
American-President Lines, Ltd.
311 California St.

Arthur M. Tode, honorary president of the national organization, is at present on the Pacific Coast aiding in the organizing of this new Propeller Club Port. First meeting of charter members will be programmed during mid-July, at which event Mr. Tode will present the new Port with the Official Charter and review the ideals, objects and accomplishments of the affiliated clubs.

Quoting newly-appointed president Tirey L. Ford: "Three points particularly appeal to me. First, and probably most important, is the opportunity for San Francisco to participate in the organized national activity for promoting the welfare of the American Merchant Marine.

"Secondly—the fact that our new Port will be comprised of men who are representative of San Francisco's leaders in ship operating, shipbuilding and allied maritime industries.

"I am also impressed with the excellent work that the Propeller Club of the U. S. is accomplishing in our universities and which we will now be able to localize in Northern California districts."

TUBBS SALES PERSONNEL CHANGES

Wallace I. Atherton

Richard Hughes, Jr.

Joseph H. Barry

Following their long established custom of making advances from within their own organization, Tubbs Cordage Company announces the following sales department changes, to be effective as of July 1.

Wallace I. Atherton, associated with the Tubbs organization for many years, will become sales manager, with headquarters in San Francisco. "Brownie," as he is affectionately known to the cordage trade, was formerly in charge of Southern California sales for Tubbs rope and twine. He will fill the vacancy caused by the recent untimely death of Stuart Henshaw.

Replacing Atherton in the Southern California territory is Joseph H. Barry, who joined the Tubbs organization twenty years ago. He has been closely identified with sales in the Northern California territory for many years and brings to his new position in the South a broad knowledge of cordage problems.

Another who has "grown up" in Tubbs Cordage Company is Richard (Dick) Hughes, Jr., who will take over sales in the Northern part of California. Dick, too, knows rope from fibre preparation to shipping room and hopes to serve his new territory in the most helpful way possible.

The many friends of A. J. Campbell and Clyde H. Black will be glad to know that Campbell will continue in charge of San Francisco Bay Area sales, while Black, oil field cordage and Pacord expert, will divide his time between the Southwestern oil fields and the cordage markets of the mid-West.

CHARLES F. BRADLEY

At a recent meeting of the board of directors of the United States Lines, Charles F. Bradley, after serving many years as secretary to **P. A. S. Franklin,** was elected to succeed **Alfred P. Palmer,** retiring from the post after 48 years of service. The change became effective the last of June, and carried with it the corresponding office in the IMM, which has a controlling interest in the former line. The U. S. Lines is the parent company of the Panama-Pacific Line, San Francisco to New York intercoastal steamship operators.

Mr. Palmer had been a member of the company since 1903, and was secretary since 1931. Mr. Bradley began his service in 1919.

TEXACO ENTERS RACING FIELD

Especially prescribed for fast motor-boats, outboard and other high powered marine crift is the new "Racing Fuel" which the Texas Company has recently introduced with great success on the Pacific Coast.

The product is the famed No. 6 brand which has been used in all of the major races back on the East Coast, proving so popular with contestants that racing fans on the Pacific seaboard have been requesting its availability in this territory.

The company announces that full details pertaining to this racing fuel are available at the various marine terminals in Los Angeles Harbor, San Francisco Bay, Columbia-Willamette and Puget Sound districts.

LESTER H. CLOUD

The Girdwood Shipping Company of Seattle, Pacific Coast agents for the J. Lauritzen Lines, on July 1 opened an office at 260 California Street in San Francisco. In charge of the San Francisco territory is Lester H. Cloud, who has been affiliated with the company's interests for several years. Mr. Cloud is manager of this district, and will be active in ship chartering, purchase and sale of vessels, etc. The Lauritzen Line will soon announce schedules for the coming season for its services to the Mediterranean, North Europe and Finland.

COL. W. C. BICKFORD

On June 22 Col. W. C. Bickford, general manager and chief engineer of the Port of Seattle, was elected president of the Northwest Marine Terminal Association. **Sam Stocking,** manager of the Shaffer Terminal, Tacoma, was appointed vice-president of the association; **H. W. Davies,** manager of the Port of Port Angeles, treasurer; and **J. R. West** of the Puget Sound Dock Operators Association, executive secretary.

J. HERBERT TODD, vice president and a director of Todd Shipyards Corporation, 1 Broadway, New York, N. Y. Mr. Todd, son of the founder and first president of Todd Shipyards Corporation, also is a director of Robins Dry Dock & Repair Co., Erie Basin, Brooklyn; and Todd Galveston Dry Docks, Inc., Galveston, Texas; subsidiaries of Todd Shipyards Corporation.

Propeller Club of California

News of the Month

Many members of the Propeller Club of California were in attendance at the impressive ceremonies staged on May 24th at the Golden Gate International Exposition on Treasure Island, where graduates of the California Nautical School were honored by the presentation of diplomas and degrees.

It is a pleasure for the publishers of PACIFIC MARINE REVIEW to salute these young men who have come through the Deck and Engine Room Departments of the State of California training ship for merchant marine officers and to wish them well in their careers.

The final get-together of Propeller Club of California members was held on June 6th, when a fine turnout just about taxed the capacity of a pair of the big Crowley launches and shipped over to the CALIFORNIA STATE anchored on the East Side of Treasure Island. A fine lunch, a grand trip on the bay, and an inspection tour through shipshape deck and engine quarters were thoroughly enjoyed.

News of "The Bilge Club"

By **William A. Mason**
Lieut. Commander, U. S. Navy
(Retired)

Colossal, stupendous and terrific . . . were the superlatives used by enthusiastic Bilge Club members in reporting the Tenth Annual Barbecue and Tournament of Golf, Baseball, Tennis, and Horseshoes held at the Palos Verdes Golf Club on Saturday, June 24th.

"Bigger and better than ever," was the slogan of President Dan Dobler and his Committeemen, and not only were their expectations realized, but they were greatly exceeded.

Over 360 members and their guests turned out for this event and participated in the sports and enjoyed the barbecue which terminated the day. This was a considerable increase over last year's attendance and took the secretary and his aides so completely unaware that they found themselves making cardboard tickets to keep up with the banner attendance.

F-B Grads

C. Arthur DuBois, executive secretary of training committee of Scovill Mfg. Company, was the speaker at the second annual graduation exercises of the Farrel-Birmingham Company apprentices, held in the classroom at the Ansonia (Conn.) plant on Monday, June 12. Diplomas were presented to fourteen 1939 graduates, while seven 1938 graduates received special recognition and were given official diplomas.

The exercises were opened with an address of welcome by **Roland G. Hartwell**, apprentice supervisor. Following the presentation of the flag, **Albert S. Redway**, vice president, took charge, and brief congratulatory talks were given by various officials of the company.

Greetings were extended to the graduate apprentices by **Nelson W. Pickering**, president of the company.

The Newport News Shipbuilding and Dry Dock Company announces the appointment, effective June 1, 1939, of **Robert I. Fletcher** as acting comptroller, with office at the plant, Newport News, Virginia.

Mr. Fletcher received his B.S. in Economics from Wharton School of Finance and Commerce of the University of Pennsylvania, and is a member of the American Institute of Accountants, Controllers Institute of America, and other professional organizations.

Immediately prior to his recent appointment he was managing accountant with R. G. Rankin and Company, New York.

J. A. EARLEY

At the annual reorganization meeting of the Port of Seattle Commission on June 5, J. A. Earley was elected president for the ensuing year, succeeding **Horace P. Chapman** Succeeding to Mr. Earley's old post of vice president, **Smith M. Wilson** is carrying on the organization's work in that capacity. Mr. Chapman has been made secretary.

Mr. Earley has long been in public service. Formerly he was King County Commissioner, and was a county field engineer for ten years. He has been county road supervisor and an engineer for the State Highway Department, in addition to several other public posts.

Names and News

J. S. Jones, nationally known industrial executive, has arrived at the American Machine and Metals, Inc., principal office in San Francisco, to take over the management of the Western Division of that corporation, which owns and operates seven well known and long established corporations as divisions catering to many basic industries.

J. S. Jones

The Troy Laundry Machinery Division of this corporation, established on the Pacific Coast for nearly fifty years; the Riehle Testing Machine Company, established in 1825, now a division of this corporation, also well known on the Coast; the Tolhurst Centrifugal machinery, catering to chemical, metal, textile, sugar, and paper industries, established in 1852, and for many years very popular in the West; the Schlangen Brewery Machinery; the Opaco Oil Station Equipment Division; the Halliwell Beauty Parlor Equipment; and DeBothezat Ventilation Equipment.

The Debothezat Division specializes in highly efficient ventilation equipment and is extensively used by the merchant marine. In this connection Mr. Jones will be well remembered by the marine trade, having been engaged in this industry for many years.

As vice-president in charge of operations of the American Machine and Metals, he has gained a wide knowledge of the products, which should be very helpful to the corporation's many customers throughout the West. His long experience in large power laundry operation, he having been an important executive with the Consolidated Laundries Corporation in New York for several years and later president of the Mid-Continent Corporation in Chicago, will also make his experience of value to the users of laundry machinery.

New Quarters

Dahl-Beck Electric Co. is now located in new quarters at 118 Main Street, between Mission and Howard Streets, in San Francisco. In the new location are increased facilities for the manufacturing of marine watertight fittings, in which this company specializes. A special department has been provided for armature rewinding and motor repairing.

A spacious storeroom provides for prompt delivery of all types of watertight fittings and shipboard electrical supplies. The Dahl-Beck organizatiaon is a direct outgrowth of the pioneer Dahl Electric Co., for over 45 years in the marine electric business in San Francisco. The Dahl-Beck Co. are exclusive agents in this territory for the following manufacturers: DeBothezat Ventilating Equipment Division of American Machine and Metals, Inc.; Van Brunt watertight fixtures and fittings; C. C. Galbraith & Son, Inc., electrical equipment; and Speer carbon and graphite brushes. The firm's enlarged quarters are now open for inspection by the shipping and industrial industries.

Mr. Beck, who took over the old well-known firm of Dahl Electric Company, was associated with Mr. Dahl for over a period of twenty years. Mr. Lalor, well-known electrical engineer of the waterfront, is associated with Mr. Beck as sales engineer.

Your Chart Awaits!

Fred J. Cordall, Marine Engineer of the Texas Company at San Francisco, is being swamped with requests for copies of the very beautiful chart of San Francisco Bay which his company has recently designed. Although no public announcement has been made of the availability of this three-color map, the word has gotten around among ship operators and seagoing men and letters have been pouring in.

The map is a very superior chart of the complete San Francisco Bay area showing soundings, shoal water, prominent points and all of the Texas Company's marine outlets.

Readers of PACIFIC MARINE REVIEW can receive a copy of the chart with the compliments of The Texas Company by addressing the magazine's home office at 500 Sansome Street, San Francisco . . . or you might write directly to Fred J. Cordall, care of the Texas Company, Hearst Building, San Francisco.

We understand that thousands of copies will be available . . . but don't wait too long!

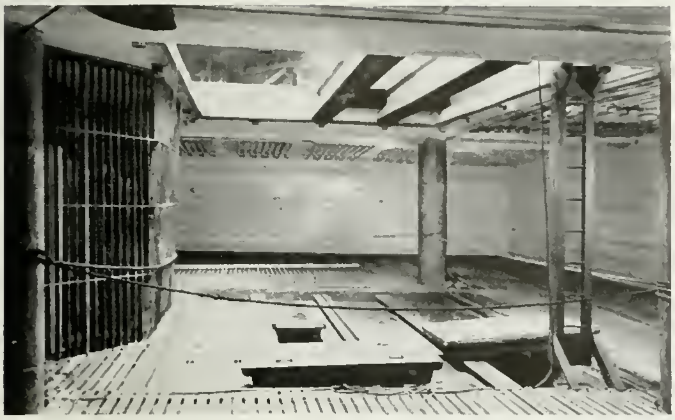
CAPTAIN "TOM" WILLIAMS

A cablegram reaching **Fred L. Doelker,** Pacific Coast manager of Grace Line, on June 7, advised of the death of Capt. "Tom" Williams on board the Santa Maria Valparaiso on that date.

Capt. Williams was one of the line's most efficient and best-liked men of the seagoing personnel. He was born in San Francisco, first learning seamanship in the Navy. After that he joined the old Panama Mail and took the motorship City of San Francisco out of San Francisco bound for the Spanish Americas. This was his first ship. Then came other commands as relief master to New York, and two years ago he left San Francisco to take over a New York to South America run.

A host of friends miss Capt. Williams, one of the finest officers on any steamship that ever sailed from San Francisco. The Grace Line flag was flown at half mast from its ships all over the world in tribute to a fine seaman.

LOW TEMPERATURE • HIGH TEMPERATURE



Marine Insulation by MUNDET

One of the largest marine insulation jobs has been completed recently by Mundet for the S. S. *Vancouver*, Hamburg-American liner. Wherever low temperature is required, on shipboard and on shore, it pays to have the dependable protection of Mundet Corkboard and Moulded Cork Pipe Covering. For high temperature requirements, Mundet's Pacific Coast warehouses carry a full line of K & M asbestos and magnesia insulation products made by Keasbey and Mattison.

MUNDET CORK CORPORATION
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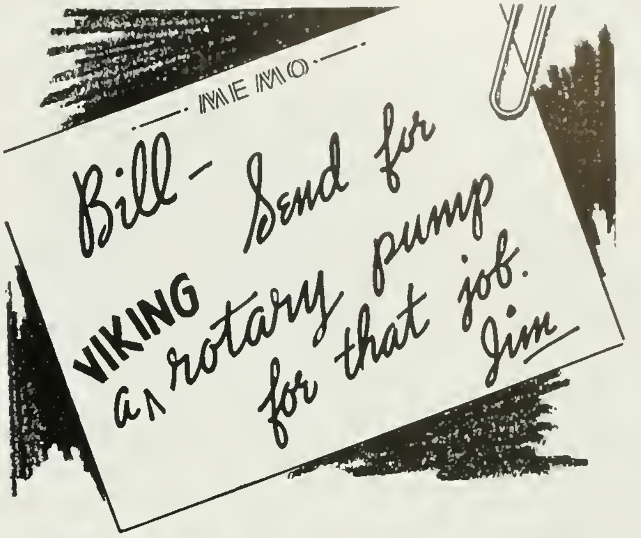
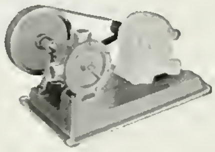
SAN FRANCISCO - - - - - - - - - - 440 Brannan St.
Distributors of Mundet Cork Insulation Products
SEATTLE - - - - - - - - Pioneer Sand & Gravel Co.
PORTLAND - - - - - - - Pacific Asbestos & Supply Co.


MEMO
Bill- Send for a VIKING rotary pump for that job.
Jim



Pacific Coast Distributors
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DeLaval Pacific Co.
61 Beale St.
San Francisco, Calif.

Bill is in charge of production . . . his job is to keep things moving. He INSISTS on VIKING ROTARY PUMPS because past experience has taught him VIKING gives more years of peak service at lower cost . . . is easier to install . . . easier to service. Viking Pumps for Marine Terminals, Barge and Tanker are found in Bulletin 2100-35 . . . write for a copy today.

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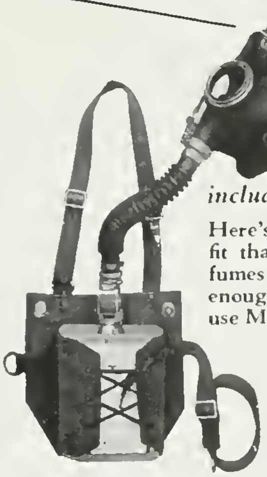

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1174 HOWARD STREET • SAN FRANCISCO

The New Marine Steam Plants

(Continued from Page 33)

to cause more serious corrosion difficulties than in older, and for other reasons, inferior oils.

● Astern Operation and Maneuvering

There are principally three regions in which astern operation creates serious design problems; namely, in the condenser, in the supporting structure and in the turbine blading. The astern wheel is usually a two-row impulse wheel, with comparatively poor efficiency. Moreover, the steam distribution to the cooling surfaces of the condenser is necessarily poor, and the amount of circulating water is often decreased during astern operation. High exhaust temperatures are inevitable, leading to severe temperature problems in the condenser tubes and the condenser shell. Serious misalignments may be caused unless adequate provisions are made for the thermal expansions. The underslung condenser shell is to be preferred from this point of view.

Prolonged astern operation is the danger of overheating the portion of the turbine which carries the ahead blading. Windage loss for a blade row depends upon the following variables:

(a) Density (absolute pressure) of the steam.

(b) Third power of the peripheral speed of the blading.

(c) Annulus of the blading.

Idling in the astern direction produces windage losses which are about 10 times those for idling in the ahead direction.

The advance toward higher operating conditions serves indirectly to increase these losses through the greater possibilities for poorer vacuum during astern operation, and through the likelihood of using higher operating speeds. The losses to be dissipated are often quite large.

The temperature which is reached in the ahead blading depends upon the manner in which these losses are dissipated. The major portion of the loss is carried by steam circulation into the exhaust. It is probable that this circulation determines the maximum temperature, when a steady state of temperature is reached. It is also probable that this temperature in many cases is high enough to be destructive. Astern operation is made possible because maximum power is usually not required long enough to reach this steady state. It is the transient state of heat flow, therefore, which is of principal interest in connection with astern operation.

The information available to the turbine designer at the present time is usually not complete enough to enable him to make a detailed quantitative analysis of a new design. With present methods it is possible to record accurately only the temperature of the cylinder. Once this is known, calculation permits at least an intelligent guess of the temperature of the blades.

Circulation of steam through the ahead blading is of the utmost importance. Very little is known about the laws which govern flow through turbine blading under abnormal circumstances of this kind, and very little can be done at present to create circulation by artificial means. Experience indicates that for normal single-flow low-pressure turbines no unsurmountable difficulties are encountered. Double-flow turbines with only one astern wheel have developed excessive temperatures in the ahead blading of the end without an astern wheel. Spray nozzles have been used to induce flow in such cases, apparently with satisfactory results. The safest means available at present to induce steam circulation is to equip double-flow turbines with an astern wheel at each end.

● Fire Hazard

The fire hazard incidental to failure of lubricating-oil pipes is very real at all operating temperatures above about 700 degrees F., and there is no fundamental difference created in this respect by further advances of steam temperatures. The case by which oil will ignite upon contact with hot steam parts is much increased by temperature, however, and the prevention of all possibilities for such fires must be regarded as a very important part of the development toward higher steam temperatures.

All steam turbines operate under very severe temperature gradients at the shaft seals to the atmosphere. In a 950 degree F. turbine the escaping steam through the glands may well be at a temperature above 850 degrees F., and the front end of the turbine cylinder may have temperatures of the same order of magnitude. A foot or so away from this cylinder is a bearing pedestal with babbited bearings and lubricating oil. The success of the arrangement is associated with intensive cooling of the rotor end. In land turbines, which usually are equipped with water glands, the latter play an important role in this connection. Marine turbines must be equipped with glands which will seal over a wide range of speed, which rules out the water glands and their incidental advantages. No specific solution for this problem has so far been advanced except increased shaft lengths and elaboration of the labyrinth seals in the steam space and in the oil.

This carries with it a degree of fire hazard which cannot be ignored. If the failue of a pipe carrying lubricating oil should cause the oil to pour over hot steam parts, the result is almost inevitably a more or less serious oil fire. Such a fire actually occurred on the German liner S.S. Potsdam and caused considerable damage. Similar less serious fires have undoubtedly occurred on other ships.

A series of rather destructive oil fires occurred a few years ago in central station turbines in the United States. These fires did not occur on units with exceptionally high steam temperatures.

These fires led to a wholesale reexamination of central station designs which has materially influenced subsequent constructions. The more permanent influences of these fires have been a general improvement in the quality of the details of the oiling system.

The elimination of oil piping to the very minimum, the replacement of flanged joints by welding wherever possible, the elimination of screwed fittings where possible, and the general use of seamless tubing, are certainly worth while.

MUNDET INSULATION

FOR LOW TEMPERATURE For all refrigeration requirements, aboard ship and on shore, be sure to have the protection of Mundet "Jointite" Corkboard and Moulded Cork Pipe Covering. This low temperature insulation gives maximum protection against heat infiltration. Economical, long-lasting, it is easily adaptable to individual requirements. Our engineering staff will be glad to help with specifications.

FOR HIGH TEMPERATURE In addition to Mundet products for low temperature, we carry a full line of the well known K & M asbestos and magnesia insulating products manufactured by Keasbey and Mattison. For full information on either low or high temperature insulation, write to the nearest Mundet office.

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PORTLAND - - - Pacific Asbestos & Supply Co.

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Waterproof—Needs no batteries

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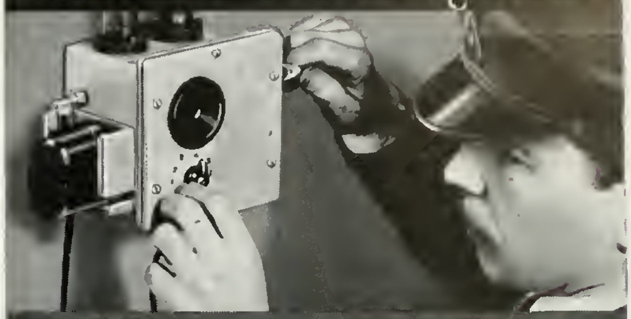

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Shipbuilding Division
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San Francisco

DRYDOCK AND ROUTINE REPAIRS: Cadaretta, Peter Lassen, Cuzco, Mauna Ala, Knud Rasmussen, U. S. Dredge A. Mackenzie, Capac, Vitus Bering, M.V. Redline, Chipana.

THE CAMPBELL MACHINE CO.

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DRYDOCK AND ROUTINE REPAIRS: California, Balboa, Southern Cross, Cabrillo, Star of the Sea, Santo Amaro.

FELLOWS & STEWART, INC.

Wilmington, Calif.

DRYDOCK AND ROUTINE REPAIRS: Cruiser Clarinda, Yachts Dwyn Wen and Astrild, Tug Lebec, Calif. F. & G. Comm. Patrol Boat Bluefin, Tug Crowley No. 26; 67 small yachts, motorboats and commercial craft.

GENERAL ENGINEERING & DRY DOCK CO.

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DRYDOCK AND ROUTINE REPAIRS: Kvichak, Paul Shoup, Gas. S. El Padre, Gas. S. California, Davenport, Oil Barge 1922, W. R. Chamberlin, Jr., Yacht Legil, Survey Boat E. W. Scripps, Lumberman, Foy Barge No. 11.

HONOLULU IRON WORKS

Honolulu, T. H.

DRYDOCK AND ROUTINE REPAIRS: Empress of Canada, U.S.C.G. Reliance, M.S. Moi, M.S. Potter.

LAKE WASHINGTON SHIPYARDS

Houghton, Wash.

NEW CONSTRUCTION: **200 foot steam geared turbine steel survey ship Explorer for U. S. Coast & Geodetic Survey.** Estimated delivery date January 1, 1940.

Timber work on two caissons for Tacoma Narrows Bridge.

LOS ANGELES SHIPBUILDING & DRY DOCK CORP.

Los Angeles Harbor
San Pedro, Calif.

DRYDOCK AND ROUTINE REPAIRS: J. S. Coney, Griffco, Catalina, M.V. Vaquero, Lawrence Phllips, Yacht Happy Days, M.V. Korrigan IV, Brandywine, F.B. Johnnie Boy, Yacht Volador, U.S.C.G.C. Itasca, Barge WORCO No. 1, Lurline Burns, La Purisima, M.V. Suruga Maru, Cascade, M.V. Gefion.

MARE ISLAND NAVY YARD

Mare Island, Calif.

NEW CONSTRUCTION:

Swordfish, Submarine (SS193); keel laid October 27, 1937; launched April 1, 1939; estimated delivery date August 1, 1939.

Two harbor tugs, YT 133 and YT 134; keels laid September 29, 1938; launched May 4, 1939.

Garbage Lighter (YG 21); keel laid July 25, 1938; launched May 4, 1939; completed May 18, 1939.

Order received for construction of one submarine tender, Fulton (AS 11); dated June 30, 1938.

Order received for construction of one submarine, Tuna (SS203); dated June 30, 1938.

Order received for construction of one submarine (SS211), dated June 2, 1939.

DRYDOCK AND ROUTINE REPAIRS: Pensacola, Louisville, Kingfisher, Vestal, Bridge, Unadilla, Clark, Cassin, Conyngham, Downes, MacDonough, Worden, Perry, Zane, Wasmuth, Trevor, Winslow, Dewey, Farragut, Dorsey, Elliot, Pollack, Plunger, Cachalot, Cuttlefish.

THE MOORE DRY DOCK CO.

Oakland, Calif.

NEW CONSTRUCTION:

Hulls Nos. 193, Walnut, and 194, Fir, two lighthouse tenders for Bureau of Lighthouses; LOA 174′ 10½″, beam molded 32′, depth 14′ 6″. Twin screw triple expansion engines; water tube boiler; 1000 horsepower. One for Pacific Coast; one for Great Lakes. Keels laid December, 1938; launched March, 1939; delivery dates August 24 and September 14, 1939, respectively.

Hulls Nos. 195 and 196, two cargo vessels for U. S. Maritime Commission; LOA 492′ 0″, LBP 465′, breadth molded 69′ 6″, depth molded 42′ 6″, SHP normal 8500, SHP max. 9350, dis. 17,600 tons, deadweight 11,926 tons; steam turbine propelled. No. 195, keel laid March 18, 1939.

DRYDOCK AND ROUTINE REPAIRS: Hawaiian, O. A. Brodin, Elizabeth, Thorshavn, Delawarean, Canadian, Puerto Rican, Santa Monica, Oregonian, Ferry Sierra Nevada, Point Caleta, Glacier, Mauna Ala, Hollywood, Dakotan, Arcata, Port of Stockton, Golden Gate, El Aquario, Carolinian, Point Arena, R. J. Hanna, Nebraskan, Lake Frances, Hercules, Saporea, Midway, Silverpalm, Etolin, Shoshone, Walter Luckenbach, Utahan, Condor, Bering, Santa Fe Barge No. 5.

THE PUGET SOUND NAVY YARD

Bremerton, Washington

NEW CONSTRUCTION:

U.S.S. Wilson (Destroyer No. 408); standard displacement, 1500 tons; keel laid March 22, 1937; launched April 12, 1939.

U.S.S. Charles F. Hughes (Destroyer No. 428); standard displacement 1600 tons; order placed by Navy Department December 7, 1937. Keel laid January 3, 1939.

Ships authorized, work not started: Woban (YT138), harbor tug; Ala, (YT139), harbor tug; Barnegat (AVP10), seaplane tender; Biscayne (AVP11), seaplane tender; Monssen (DD436), destroyer; AVP12; AVP13.

DRYDOCK AND ROUTINE REPAIRS: Maryland, Saratoga, Salt Lake City, Pyro, Utah, Houston, Idaho.

TODD SEATTLE DRY DOCKS, INC.

Harbor Island
Seattle, Wash.

DRYDOCK AND ROUTINE REPAIRS: Barge MT No. 8, Edward Luckenbach, Edgar F. Luckenbach, Tanana, David W. Branch, North King, Sutherland, Walter A. Luckenbach, Dellwood, Julia Luckenbach, West Camargo.

WESTERN BOAT BUILDING CO., INC.

2505 East 11th Street
Tacoma, Wash.

NEW CONSTRUCTION:

Hull No. 134, tuna clipper 90′ x 24′ x 13′; 275 H.P. Union Diesel. Launching date February 15, 1939.

Hull No. 136, purse seine fishing boat 96′ x 22′, powered by 240 H.P. Atlas Diesel engine. Keel laid January 30, 1939; launching date March 1, 1939.

Atlantic, Lakes, Rivers

AMERICAN BRIDGE COMPANY

Pittsburgh, Pa.

NEW CONSTRUCTION:

One relay barge 104′ x 34′ x 8′ for the Panama Canal. Delivery date January 1, 1940.

Fifteen double deck covered barges 198′ x 35′ x 11′ for Mississippi Barge Line Co., St. Louis, Mo.

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BATH IRON WORKS
Bath, Maine

NEW CONSTRUCTION:

Hulls Nos. 170-171, DD409, Sims, and DD410, Hughes, two 1500-ton destroyers for U. S. Navy; contract date October 12, 1936; keels laid July 15 and September 15, 1937, respectively; **launching** dates, April 8 and **June 17, 1939, respectively; delivery dates,** July and September, 1939, respectively.

Hulls Nos. 177 and 178, DD423 and DD424, two 1620-ton destroyers for U. S. Navy. Contract date September 30, 1937; delivery dates April and June, 1940, respectively.

Hulls Nos. 180-181, DD429 and DD430; two 1620 ton destroyers for U. S. Navy. Contract dated August 15, 1938; delivery dates, December, 1940, and February, 1941, respectively.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Fore River Yard
Quincy, Mass.

NEW CONSTRUCTION:

CV7, Wasp, Airplane Carrier for U. S. Government; keel laid April 1, 1936; launched April 4, 1939.

Hulls Nos. 1468. Ancon; and 1469, Cristobal; two passenger and freight steamers for Panama Railroad S.S. Co.: 486 feet x 64 feet x 38 feet 6 inches; 16½ knot speed. Keels laid, No. 1468, October 25, 1937; No. 1469, November 15, 1937; launching dates, December 10, 1938, and March 4, 1939.

Hulls Nos. 1470 and 1471, two 1500-ton destroyers for U. S. Government; delivery dates March, 1940 and May, 1940.

Hulls Nos. 1474, 1475, 1476 and 1477, four freight vessels for American Export Lines, Inc.; 450′ B.P. x 66′ x 42′3″; 16½ knots; geared turbines and water tube boilers. Keel laid No. 1474, November 10, 1938; No. 1475, December 16, 1938; No. 1476, March 16, 1939.

Hull No. 1478, Massachusetts; 35,000 ton battleship for U. S. Navy.

Hulls Nos. 1479 and 1480, two 6000-ton cruisers for U. S. Government.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Sparrows Point Yard
Sparrows Point, Md.

NEW CONSTRUCTION:

Hulls Nos. 4329, 4330, 4331; three 16,300 dwt. ton tankers for Standard Oil Co. of N. J.; 18 knots speed. Contract signed January 3, 1938.

Hulls Nos. 4332, Mobilfuel, and 4333, Mobilube; two 16,100 dwt. tankers for Socony Vacuum Oil Co. Contract signed February, 1938. No. 4332 launched February 25, 1939; No. 4333 launched April 29, 1939. **No. 4332 delivered May 24, 1939.**

Hulls Nos. 4337-4339, three passenger and cargo ships for Mississippi Shipping Co. Contract signed December 21, 1938.

Hull No. 4340, tanker for Union Oil Co. of Calif. Contract signed May 1, 1939.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Staten Island Yard
Staten Island, N. Y.

NEW CONSTRUCTION:

Hulls Nos. 8001, Navajo; 8002, Seminole; and 8003, Cherokee—three U. S. Navy fleet tugs. No. 8001, keel laying date December 12, 1938; launching date September 15, 1939; delivery date February 15, 1940. No. 8002, keel laying date December 16, 1938; launching date November 15, 1939; delivery date April 15, 1940. No. 8003, keel laying date December 23, 1938; launching date January 15, 1940; delivery date June 15, 1940.

BOSTON NAVY YARD
Boston, Mass.

NEW CONSTRUCTION:

DD402, Mayrant, and DD403, Trippe, two light destroyers for United States Navy; LBP 334′, beam 35′6″ depth 19′8″; keels laid April 15, 1937; launched May 14, 1938; estimated delivery dates indefinite.

DD415, O'Brien, and DD416, Walke, two destroyers; LBP 341′, beam 36′, depth 19′8″; keels laid May 31, 1938; launching date September, 1939; delivery dates May, 1940, and July, 1940.

DD425, Madison, and DD426, Lansdale, two destroyers; 341′0″ x 36′0″ x 19′8″. Keel laying date December 19, 1938; launching date September, 1939; delivery dates August and December, 1940.

DD433 and DD434, two destroyers. 341′0″ x 36′0″ x 19′8″, contract awarded July 23, 1938. Keels laid June 1, 1939; completion dates March and May, 1941.

DD441 and DD442, two destroyers; contract awarded May 29, 1939; completion dates July, 1941, and September, 1941.

BROOKLYN NAVY YARD
Brooklyn, N. Y.

NEW CONSTRUCTION:

CL 50, Helena, light cruiser; L.B.P. 600′ beam 61′7¾″, standard displacement 10,000; geared turbine engines; express type boilers; keel laid December 9, 1936; launched August 27, 1938; estimated delivery November 2, 1939.

BB 55, North Carolina, battleship; L.B.P. 714′ 0″, beam to outside armor 108′ 0″, std. displ. 35,000 tons; geared turbine engines; express type boilers. Keel laid October 27, 1937; estimated launching date March 1, 1940; contract delivery September 1, 1941; estimated delivery date October 15, 1941.

Battleship No. 61, order placed June 2, 1939; to be built under authority of Naval Appropriation Act for year 1940. Building period 49 months, beginning July 1, 1939.

CHARLESTON, S. C., NAVY YARD
Charleston, S. C.

NEW CONSTRUCTION:

One harbor tug, Massasoit (YT131); LOA 110′, beam 24′; authorized August 12, 1937; keel laid July 25, 1938; launched December 13, 1938.

One harbor tug, Heekon (YT141); LOA 100′, beam 25′; authorized July 7, 1938.

One harbor tug, Nokomis (YT142); LOA 100′, beam 25′; authorized July 7, 1938.

Four destroyers.

THE DRAVO CORPORATION
Engineering Works Division
Pittsburgh, Pa., and Wilmington, Del.

NEW CONSTRUCTION:

Hull No. 1489, one welded ash removal barge for Dept. of Sanitation, City of N. Y.; 150′ x 37′; 553 gross tons.

Hull No. 1543, one 25-ton floating crane for Navy Dept. Bureau of Yards & Docks; 335 gross tons.

Hulls Nos. 1549-1555, seven welded steel coal barges 175′ x 26′ x 10′ 8″ for stock; 3304 gross tons.

Hulls Nos. 1560-1561, two double bottom cargo barges 175′ x 26′ x 11′ for stock; 1060 gross tons.

Hulls Nos. 1562-1567, six welded flush deck cargo box barges 100′ x 26′ x 6′ 6″ for stock; 990 gross tons.

Hull No. 1568, one pontoon type whirler boat 60′ x 53′ 2″ x 7′ for stock; 188 gross tons.

Hulls Nos. 1569-1572, four welded flush deck cargo box barges 130′ x 30′ x 7′ 6″ for stock; 1000 gross tons.

Hulls Nos. 1573-1574, two welded steel coal barges 134′ x 34′ x 17′ for stock, 1534 gross tons.

Hulls Nos. 1575-1577, three welded steel oil barges 195′ x 35′ x10′ 6″ for stock; 1833 gross tons.

ELECTRIC BOAT CORP.
Groton, Conn.

NEW CONSTRUCTION:

Hull No. 31, Spearfish (SS190); standard displacement 1450 tons; keel laying date September 9, 1937; launching date October 19, 1938; **delivery date July 17, 1939.**

Hull No. 33, Seadragon (SS194); 1450 tons; keel laying date April 18, 1938; launched April 21, 1939; delivery date December, 1939.

Hull No. 34, Sealion (SS195); 1450 tons; keel laying date June 20, 1938; launched May 25, 1939; delivery date February, 1940.

Hull No. 35, Tambor (SS198); standard displacement 1475 tons; keel laying date January 16, 1939; delivery date January, 1941.

Hull No. 36, Tautog (SS199); standard displacement 1475 tons; keel laying date March 2, 1939; delivery date March, 1941.

Hull No. 37, Thresher (SS200); standard displacement 1475 tons; keel laying date May 15, 1939; delivery date May, 1941.

Hull No. 39 (SS206); standard displacement 1475 tons.

Hull No. 40 (SS207); standard displacement 1475 tons.

Hull No. 41 (SS208); standard displacement 1475 tons.

THE FEDERAL SHIPBUILDING AND DRY DOCK COMPANY
Kearny, N. J.

NEW CONSTRUCTION:

Two destroyers, DD411 Anderson and DD412 Hammann; keels laid November 15, 1937, and January 17, 1938, respectively; launching date February 4, 1939. **No. DD411 delivered May 18, 1939.**

Hulls Nos. 151, 152 and 153, three tankers for Standard Oil Co. of New Jersey; keels laid, No. 151, July 1, 1938; No. 152, July 15, 1938; No. 153, March 13, 1939. Launching dates, No. 151, March 4, 1939; No. 152,

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April 29, 1939. **No. 151, Markay, delivered May 25, 1939.**

Hulls Nos. 154-159, six C-2 cargo vessels for U. S. Maritime Commission. Keels laid, No. 154, August 25, 1938; No. 155, September 20, 1938; No. 156, January 3, 1939; No. 157, March 16, 1939; Nos. 158 and 159, May 26, 1939; launching dates, Nos. 154 and 155, May 20, 1939.

Hulls Nos. 160 and 161, two torpedo boat destroyers for the United States Navy. Keels laid March 1, 1939.

Hulls Nos. 162-167, six C-3 cargo vessels for U. S. Maritime Commission. Keel laid, No. 162, May 8, 1939.

Hulls Nos. 168-169, two 6000 ton cruisers for the U. S. Navy.

LEVINGSTON SHIPBUILDING CO.

Orange, Texas

NEW CONSTRUCTION:

One twin screw tunnel-type shallow draft towboat; LOA 100′, beam OA 24′ 8¾″, depth 7′ 3″; powered with two 275 H.P. Atlas diesel engines; for Asiatic Petroleum Corp., N. Y., N.Y. Delivery date August, 1939.

One all welded towboat; LOA 80′, beam OA 22′ 7″, depth 9′ 6″. Powered by 550 H.P. diesel. For W. G. Coyle & Co., New Orleans, La.

MANITOWOC SHIP BUILDING CO.

Manitowoc, Wis.

NEW CONSTRUCTION: **Six hopper barges** 158′ x 26′ x 10′, capacity 800 tons, for Marine Transit Co., Chicago, Ill. **Delivered.**

One river towboat 100′ x 25′ x 8′, for Marine Transit Co., Chicago, Ill. **Delivered.**

THE NEW YORK SHIPBUILDING CORPORATION

Camden, N. J.

NEW CONSTRUCTION:

One destroyer tender for U. S. Navy; order placed December 27, 1937. Launched May, 1939.

One seaplane tender for U. S. Navy; order placed December 27, 1937.

One destroyer tender for U. S. Navy; order placed October 14, 1938.

One seaplane tender for U. S. Navy; order placed October 14, 1938.

One battleship for U. S. Navy; order placed December 1, 1938.

NEWPORT NEWS SHIPBUILDING & DRYDOCK CO.

90 Broad Street, New York

NEW CONSTRUCTION:

H362, light cruiser, CL49, St. Louis, keel laid December 10, 1936; launched April 15, 1939; **delivered May 19, 1939.**.

Hulls Nos. 363-364, two destroyers, Nos. 413, Mustin, and 414, Russell; keels laid December, 1937; launched December 8, 1938.

Hull No. 369, twin screw mail, passenger and cargo liner for United States Lines Co.; length 723′, beam 92′, depth 45′. Keel laid August 22, 1938.

Hulls Nos. 370, 371 and 372, three oil tankers for Standard Oil Company of New Jersey; gross tonnage about 11,500 tons; L.B.P. 525′, breadth molded 75′, depth molded 39′. Keels laid, No. 370, January 16, 1939; No. 371, May 8, 1939.

Hulls Nos. 373, 374, 375 and 376, four single screw cargo vessels for United States Maritime Commission; turbine propulsion; gross tonnage about 9000 tons; length 435′, breadth 63′, depth 40′ 6″. Keels laid, No. 373, November 14, 1938; No. 374, November 28, 1938; No. 375, March 6, 1939; No. 376, May 1, 1939. No. 373 launched April 28, 1939.

Hull No. 378, battleship, 58, Indiana, for U. S. Navy.

Hulls Nos. 379, 380, 381, 382, 383 and 384, six single screw combination passenger and cargo vessels for U. S. Maritime Commission; length 465′, breadth 69′ 6″, depth 42′ 6″, gross tonnage about 8000 tons.

Hull No. 385, aircraft carrier No. 8, Hornet, for U. S. Navy.

PORTSMOUTH, N. H., NAVY YARD

Portsmouth, N. H.

NEW CONSTRUCTION:

Four submarines, Searaven, Seawolf, Triton and Trout.

THE PUSEY & JONES CORP.

Wilmington, Del.

NEW CONSTRUCTION:

Hull No. 1070, one steel hopper dredge, Chester Harding; 2,500 cubic yard capacity; length overall 308′2″, length B.P. 300′0″, breadth molded 56′0″, depth molded 29′0″. Contract date February 14, 1938; keel laid May 15, 1938; launched January 20, 1939; **delivery date June, 1939.**

Hull No. 1071, one steel lighthouse tender, Lilac Class, for Dept. of Commerce, Bureau of Lighthouses. Gross tonnage approximately 700 tons. Keel laid Octobet 17, 1938; **completion date July 5, 1939.**

Two streamlined diesel tugs for Curtis Bay Towing Company; powered by 320 H.P. Enterprise engines; cost $200,000.

SUN SHIPBUILDING AND DRY DOCK COMPANY

Chester, Pa.

NEW CONSTRUCTION:

Hulls Nos. 175-180, six single screw diesel cargo vessels, C-2 design, for U. S. Maritime Commission; equipped with Sun-Doxford engines. Keel laying dates July 25, 1938; July 26, 1938; August 27, 1938; August 28, 1938; January 14, 1939; March 6, 1939. Launching dates, No. 175, April 22, 1939; No. 176, May 18, 1939. **Delivery dates July 6, 1939;** September 2, 1939; November 1, 1939; December 31, 1939; March 1, 1940, and May 1, 1940.

Hull No. 181, single screw steam turbo electric drive tanker for Atlantic Refining Co.; 521′ x 70′ x 40′. Keel laid November 21, 1938; **delivery date July 29, 1939.**

Hulls Nos. 182, 183, 184 and 185, four single screw diesel cargo vessels for U. S. Maritime Commission, C-3 design. Equipped with Busch Sulzer engines. Delivery dates November 15, 1939; December 20, 1939, January 20, 1940, and February 20, 1940.

Hulls Nos. 186-189, four C-3 single screw combination passenger and cargo vessels; diesel propelled; equipped with Sun-Doxford engines. Delivery dates October 6, 1940; December 5, 1940; February 3, 1941, and April 4, 1941.

One 16-knot tanker for Texas Co.; 13,285 tons dwt. Delivery date June, 1940.

TAMPA SHIPBUILDING & ENGINEERING CO.

P. O. Box 1838

Tampa, Fla.

NEW CONSTRUCTION:

Hulls Nos. 33-36, four C-2 type cargo vessels for U. S. Maritime Commission; 435′ x 63′ x 31′ 6″; 9291 dwt. tons; diesel powered; cost $1,815.663 each.

Pacific Northwest Marine Review

(Continued from Page 50-B)

matic voltage regulators for charging batteries off the main engines has been continued with marked success. Most of the purse seiners have space for a crew of 11 men, a captain, and 160 tons of fish. Among the important ships built there this season are: J. D. Martinolich, 80 ft., 200 H.P. Enterprise diesel; Ardito, 80 ft., 280 H.P. geared Fairbanks Morse diesel with Joes reduction gear; Progress, 78 ft., 210 H.P. Fairbanks Morse diesel; Juanita, 82 ft., 280 H.P. Fairbanks Morse geared diesel; Anna B., 82 ft., 280 H.P. Fairbanks Morse; Exposition King, 82 ft., 280 H.P. Fairbanks Morse diesel.

At the J. M. Martinac yard in Tacoma there will be three large purse seiners turned out this season. All of these are 82 x 21 x 10.8 ft. and two of them have 230 H.P. Union diesels and one a 220 H.P. Atlas diesel, and all are for Monterey, California, fisheries. The Martinac yard will also turn out a 50 ft. halibut-tuna troller powered with a 110 H.P., 6 cylinder Buda diesel for use at Astoria, Ore.

The Maritime Shipyards in Seattle, now located in the old Gulowsen Grei plant, with 100 per cent covered ways, turned out 13 scows and three gillnetters. Three of the scows are 72 x 24 ft. and two of them are powered with a pair of 60 H.P. Superior diesels. One has a pair of 95 horsepower Buda diesels, for the Alaska Packers Assn. of San Francisco, and the other has 2-100 H.P. Superior diesels. The gillnetters are all sailing ships.

AUGUST, 1939

PACIFIC MARINE REVIEW

The S S Challenge

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PACIFIC MARINE REVIEW

Contents for August, 1939

Editorial Comment:

America in World Shipbuilding.................. 17
Pacific Coast Chance on C-1 Bids.................. 17
Smuggling Fine Libel.................. 17
Subversive Activities Produce Unemployment.................. 17

The Challenge Makes Good!.................. 18
First Steam Drive C-2 Breaks Fuel Economy Records.

The Donald McKay of 1939.................. 22
The First C-2 Standard Cargo Vessel.

The U. S. Lighthouse Tenders Walnut and Fir.................. 26

Pacific Northwest Marine Review.................. 30

Ammonia Refrigeration on the Baby Tuna Clippers.................. 32
By David W. Dickie.

Your Problems Answered.................. 36
By "The Chief."

Steady as You Go!.................. 39
Radio Navigation at Sea and in the Air.

The Airflex Clutch.................. 42

Twenty New Picket-Boats for Coast Guard Fleet.................. 47

On the Ways.................. 44
Latest News from American Yards.

Building in American Yards.................. 60

Miscellaneous: Literature of the Industry, 35, 64; Engineers' Licenses, 38; Deck Officers' Licenses, 40; Anniversary for Aquitania-Sperry, 48: New Metallic Compound for Hard Service Valves, 48.

PUBLISHED AT 500 SANSOME STREET. . . . . SAN FRANCISCO

Entered as second class matter June 20, 1913, at the post office, San Francisco, under the Act of March 3, 1879. Published on the 1st of each month. Advertising and editorial forms close on the 15th. Subscription price, one year: Domestic, $1.50; foreign, $2.50; two years: Domestic, $2.50; foreign, $4.00; three years: Domestic, $3.00; foreign, $5.50; single copies, 25c. Chas. F. A. Mann, Northwest Representative, 1110 Puget Sound Bank Bldg., Tacoma, Washington. New York Office, Suite 404-405-406, Two Hundred Broadway, Telephone COrdlandt 7-3579.

In New York City copies of Pacific Marine Review can be purchased at the news stands of I. Goldberg, 42 Broadway; Harry Nash, 17 Battery Place; Philip Mandara, Greenwich Street and Battery Place. In Washington, D. C., at the news stand of the Carlton Hotel, 16th and K Streets.

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Assistant Editor

The Challenge

•

Hatches, booms, winches and resistor houses, forward deck of S. S. Challenge.

•

Recent trials of the first C-2 steam turbine drive ship, the Challenge, built by the Federal Shipbuilding and Dry Dock Company, indicate that unofficially her propulsion machinery has made a world record on fuel economy for marine power plants with a figure of 0.552 pounds of oil per shaft horsepower hour for all purposes. We understand that the second ship of the six sisters building at Federal, the Red Jacket, is slated for a full Navy standard trial at the Rockland measured mile and that results obtained there will be official and beyond question.

This remarkable fuel economy has raised considerable interest in the ship's power plant, and we are therefore publishing this description of her boilers and turbines.

The Challenge and her five sister C-2 ships being completed by Federal Shipbuilding & Drydock Company are propelled by highly efficient General Electric turbines and gears. The design of this equipment is based on G-E experience in equipping more than 400 ships with geared-turbine propulsion in the last twenty-five years.

The G-E turbine unit in the Challenge is of the cross-compound impulse type and consists of a high-pressure and a low-pressure turbine. It is connected to the propeller through double-reduction gears.

The rotor of the high-pressure turbine rotates at 6100 r.p.m. and that of the low-pressure rotor at 4050 r.p.m.

Normal rating of the turbine-gear set is 6000 horsepower at 92 r.p.m. propeller speed and it can maintain a continuous output of 6600 h.p.

The turbines are supplied with steam at 440 lbs. gage and 740 F. total temperature. They exhaust into the condenser at 28½ in. vacuum. The astern turbine for reversing is built into the low-pressure turbine casing. It normally rotates in a high-vacuum to keep down rotating losses.

High sustained economy is built into the G-E turbines for these six C-2 vessels by careful design and manufacture of all parts of the steam path. The nozzles and buckets forming the path consist of accurately shaped sections made of materials selected for their corrosion and erosion-resisting qualities.

Steam is at a practically constant pressure after it leaves the nozzle, during its passage through the buckets, and in the space surrounding the wheel. Excellent steam distribution is obtained because of the large dome which forms part of the low-pressure turbine.

The diaphragms, of which the nozzles are a part, are made from welded steel boiler plate with welded-in, accurately-spaced nozzle partitions of noncorrosive material. The buckets are dovetailed into the wheels with a tight machine fit which does not require calking and which will stay tight after years of service.

In the lower stages, the disphragms are arranged to collect moisture that is thrown out centrifugally and to drain it to the condenser. This improves the efficiency and aids in preventing bucket erosion.

The turbine casings are split on the horizontal center. Joints are metal to metal. The rotors are of solid forgings with the wheels machined integral with the shaft. A steam deflector between the ahead and the astern buckets is also machined integral with the shaft.

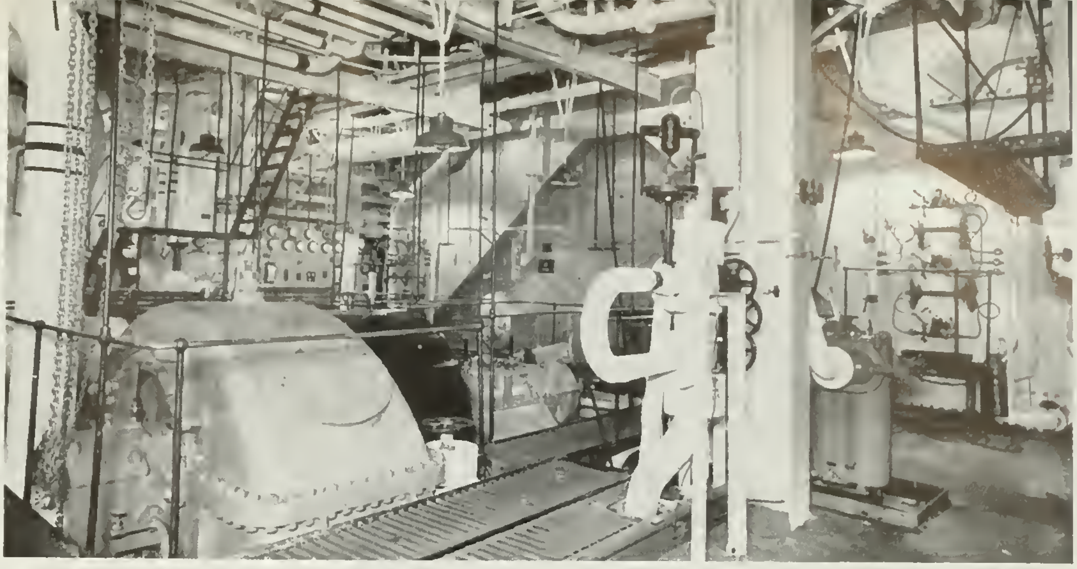
To minimize steam leakage along the turbine shaft, packings are used at the high-pressure and low-pressure ends. They consist of multiple segmented carbon and metallic rings.

The carbon packings are individual smooth rings made of best grade carbon, and when in service they attain a high polish which minimizes friction and adequately seals the unit.

Metallic packings are of the labyrinth type and are made from a special alloy which, if in contact with the shaft, will not cause local heating and consequent distortion of the shaft.

Packing rings, whether metallic or carbon, are divided into segments for easy inspection or repair, and each ring is held firmly in place by flat steel springs which retain their strength in high-temperature service.

The main bearings of the turbine are of the babbitt-lined, spherical-



In the engine room of the Challenge modern American water tube boilers and double reduction geared turbines produce power at very low rates of fuel consumption.

makes Good!

First Steam Drive C-2 Breaks all Fuel Economy Records

seated, self-aligning type, pressure-lubricated and cooled by oil from the ship's lubricating system. They are finished to exact dimensions to permit interchangeability, and can easily be removed without disturbing the turbine shaft or any part except the bearing caps.

A thrust bearing is furnished to maintain the correct axial spacing between the stationary and rotating parts, and to compensate for the relatively small unbalanced thrust in an impulse-type turbine. This thrust bearing is of the improved tapered land type consisting of a hardened steel collar running against plates faced with babbitt segments set at a slight angle to the runner to give tapered oil films between the runner and the babbitt-faced segments, or lands.

This thrust bearing requires no adjustments in service, and besides being compact, is designed with a liberal margin of safety. As an additional precaution, the thrust bearing has "squealer rings" which rub and temporarily act as a thrust bearing to prevent damage to the rotating parts if the thrust-bearing babbitt should wear unduly.

● Double Reduction Gear

The reduction gear, of the double-helical type, is of a design and construction of proved durability and efficiency, and retains proper running contact under continuous and extended service. It consists of two high-speed pinions each driving a high-speed gear. The two high-speed gears are connected to two low-speed pinions, which in turn drive the low-speed gear.

The steel casing enclosing the rotating elements is of heavy, rigid construction designed to retain the gear and pinion bearings in accurate alignment. To facilitate removal for repairs or inspection, the casing is divided into several sections. The lower portion of the low-speed gear casing is split on the horizontal center line of the low-speed gear shaft. The upper portion of the casing has pinion covers split on the horizontal center lines of the pinions. The joints between the casings are made right without gaskets by an improved lapping process which prevents the escape of oil vapor.

The high-speed gear wheels are of the cast-steel type.

The low-speed gear is of the fabricated type, consisting of a forged shaft with integral coupling, a cast-steel hub with plates, and rim. The plates are welded to the rim and hub. The gear wheel is annealed to

'Tween deck spaces.

relieve all internal strains.

The pinions are solid with their shafts and made of nickel steel forging properly quenched and tempered. They are so proportioned as to insure uniform distribution of tooth pressure over the face.

All flexible couplings are of the high-speed type, dynamically balanced and arranged for proper lubrication of the wearing parts.

The bearings of the gear are of the straight-seated, babbitt-lined, pressure-lubricated type. Each high-speed pinion, high-speed gear, low-speed pinion and low-speed gear has two bearings.

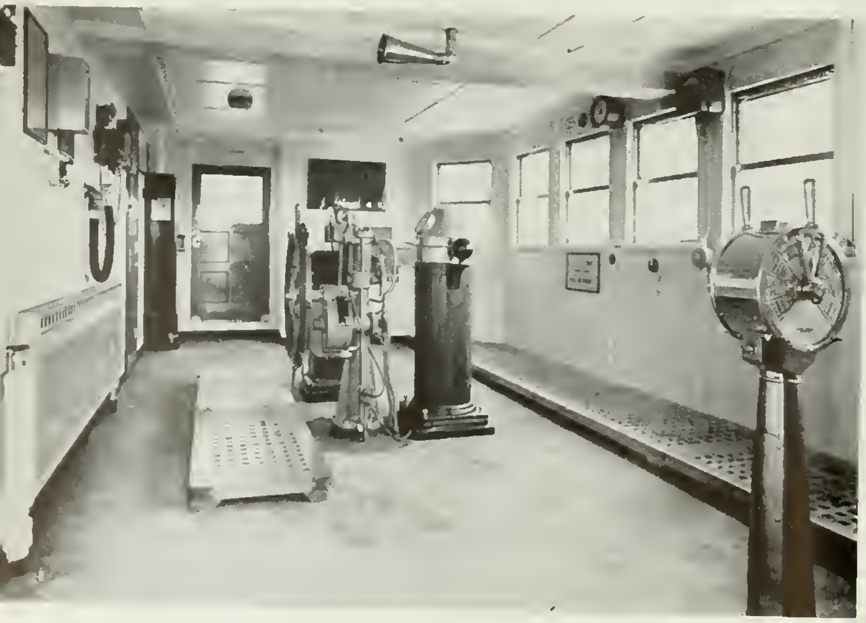
The main thrust bearing is of the Kingsbury type, and is arranged in a housing on the forward end of the low-speed gear casing. The lower part of the thrust housing is integral with the lower-half gear casing and arranged with ample footing for heavy bolting to the ship's structure.

The turning gear is of the motor-operated type connected through a clutch to one of the high-speed pinions. The motor is reversible and is provided with magnetic control panel and drum controller.

The six thousand shaft horsepower of the Challenge originates in two marine steam generators of unusual interest. They are based on a design known as the "D" type which has been widely used in the American Merchant Marine since 1935, when the first boilers of the type were fitted to the R. P. Resor and the T. C. McCobb. In each case two boilers have been set in a single steel casing to provide an arrangement which makes for maximum compactness and accessibility.

The furnace of the original "D" type steam generator was fitted with water-cooled floor, side wall and roof. Subsequently, additional water cooling was added in the back wall—opposite the oil burners. In the new class C-2 steamers, however, the ultimate in water cooling of furnaces has been developed and in addition to the back wall, water cooling is used in the front wall also, the tubes being so arranged as to permit installation of the burners between the rows of tubes. In addition, there are a greater number of tubes in the floor and in the roof, thus providing additional circulation capacity for the side and end walls.

The designation "D" type is taken from the shape of the boiler unit, which approximates a capital "D." A large steam drum is placed vertically above a somewhat smaller water drum and connected to it with rows of boiler tubes. The furnace is set at the side and occupies the space corresponding to the curved portion of the capital "D." Placing the furnace at the side of the heating surface instead of below it permits the use of as large a furnace as necessary to thoroughly burn the fuel before it enters the tube bank. Sufficient time element is essential for complete combustion. Between the third and fourth rows of boiler tubes from the furnace there is space for the installation of a bare tube convection superheater—the first three rows of boiler tubes are larger than those in the last passes, and form an effective screen between the superheater and the furnace.



The pilot house of S. S. Challenge affords ample space for the navigator to use all instruments to best advantage.

Three oil burners are arranged one above the other in a vertical row at the front of the furnace, thus providing maximum clearance between the edges of the flames and the walls of the furnaces. Gases leaving the furnace pass through the first bank of tubes and upwardly across the superheating surface to the top of a vertical steel baffle, thence downward parallel to the tubes in the last bank of the boiler to the water drum. The gases then turn upward and flow vertically, first past sixteen rows of economizer tube surface and then through the air heater to the stack.

A completely water-cooled furnace of tubular design is distinctly uncommon on shipboard but seems destined to gain much favor. The provisions for ample circulation must be thoroughly worked out and in this case the headers at the front, rear and side of the furnace are fed with water from the water drum. Discharge tubes from collecting headers at the top of the water walls are run directly into the steam drum, below the water level. The water wall tubes are set as closely together as possible and are virtually tangent, thus creating the equivalent of a steel-lined furnace.

The operating pressure is 450 lbs. per square inch and the final steam temperature 765 deg. F. The superheater is provided with mechanical steam soot blowers. Each superheater element may be removed without disturbing more than two others; the superheater is of self-draining type.

The economizer is of extended surface, cast iron, marine design fitted with soot blowers to maintain clean surfaces without hand lancing. The cast iron rings are shrunk upon seamless steel boiler tubes and give six times the area for heat absorption from low temperature flue gases that would be presented by the same length of bare tubing. In addition, the cast iron protects the tubing from corrosion. Feedwater for the boiler flows downward through the economizer, counter current to the flow of flue gases, thus effecting maximum efficiency.

Final heat recovery is made in a tubular air preheater in which the tubes are arranged horizontally and through which the air for combustion

(Continued on page 29)

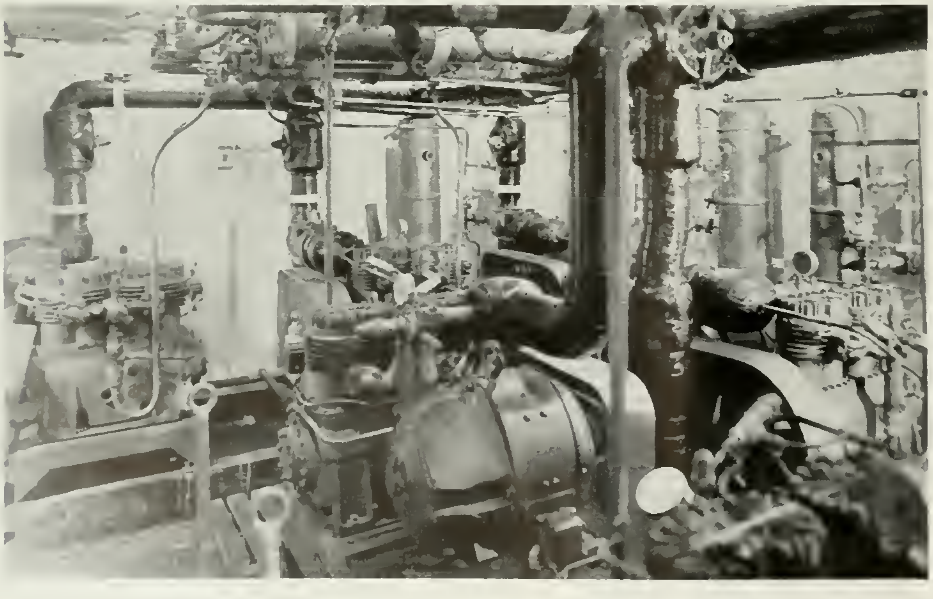
Officers' and crew's quarters on the Challenge are modern, sanitary, spacious and comfortable. Here are shown the galley and the officers' mess.

The Donald McKay of 1939

America's Largest Marine Diesel

In the issue of Pacific Marine Review for July, 1939, we carried a complete description of the C-2 standard cargo motorship Donald McKay, recently completed by the Sun Shipbuilding and Dry Dock Company and delivered to the Moore-McCormack Steamship Lines through the U. S. Maritime Commission.

Donald McKay is the first of six sister motorships building at Sun, all of which have been allocated to the Moore-McCormack Lines. Donald McKay, named for the famous American clipper ship builder, was launched April 22. On May 18 the second of this series was launched and christened Mormachawk. A third was launched June 15 and christened Mormacwren. In the middle of July, August and September the other three were or will be launched and christened repectively Mormacgull, Mormacdove and Mormaclark. It is a fair inference that the name Donald McKay will in the near future be changed to another Mormac-bird designation.



Carrier Brunswick refrigerating machinery on Donald McKay.

Since there has come to us considerable inquiry about the 6,000 b.h.p., four-cylinder diesel that forms the main propulsion unit of these ships, we have secured from the builders and here reproduce their description of this prime mover and some of its auxiliaries.

The Sun-Doxford opposed-piston type propulsion diesel of the Donald McKay is a four-cylinder engine with cylinders 32 in. in diameter having a combined stroke of 95 in. It is rated 6,000 B.H.P. at 92 r.p.m., 6,600 B.H.P. at 95 r.p.m. and 7,500 B.H.P. for two hours at 100 r.p.m.

The bed plate is of steel plates, welded, the cross-members being arranged to receive spherical, cast-iron main bearings. The columns, five in number, are of welded steel and form A-frames over the main

nerican Engineering Company auxiliaries on Donald McKay include not only the windlass and the steering gear shown left and right above, but also eighteen 50-H.P. electric cargo winches and a 35-H.P. electric capstan.

Installed on the First C-2

Standard Cargo Vessel

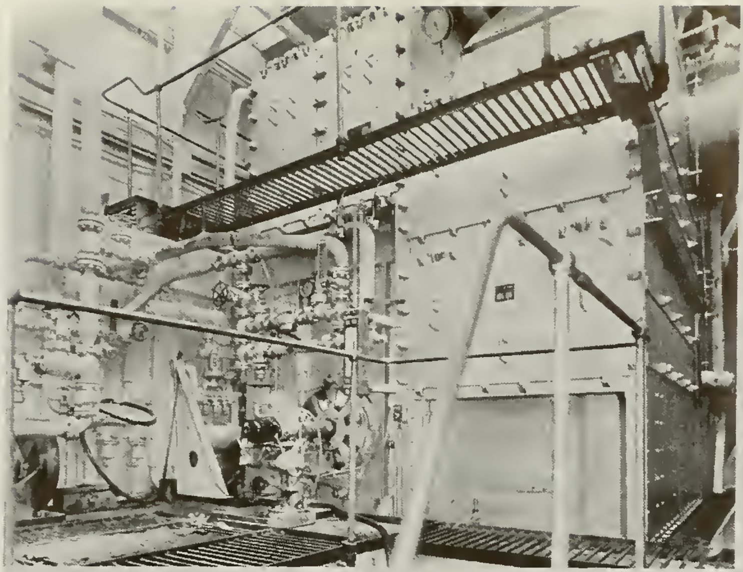
earings. These frames are tied to- ether to form a unit structure by ı entablature which rests on top ' and is bolted to the five frames. he entablature is made in two sec- ons, built up of steel plates and elded, the two sections being bolt- l together, and provided with bores receive tthe cylinders. Openings these bores register with the linder scavenging ports. The rear olumns of the A-frames serve to ıpport the cast steel crosshead uides, there being three guides for ach cylinder, one for the crosshead ' the lower piston and two for the rossheads of the upper piston. All ' these guides are water cooled.

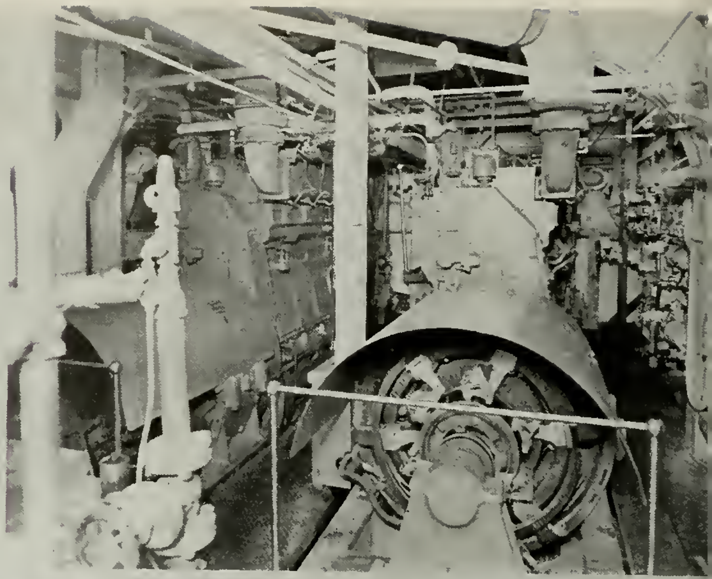
The cylinders are of usual Sun- oxford construction, each consist- g of a liner, open at both ends, with a water jacket shrunk on the center portion. Near the lower end is a circumferential ring of scavenging ports, so shaped as to give the air a swirling motion as it enters the cylinder. The exhaust ports are located near upper end of liner, so that uni-flow scavenging is obtained. Bores through jacket and liner at the mid-point receive an injection valve and air starting valve on front side, and a second injection valve, a relief valve and a brake valve on back side. The liners are given a final finish by honing, thus assuring a minimum amount of initial wear-in.

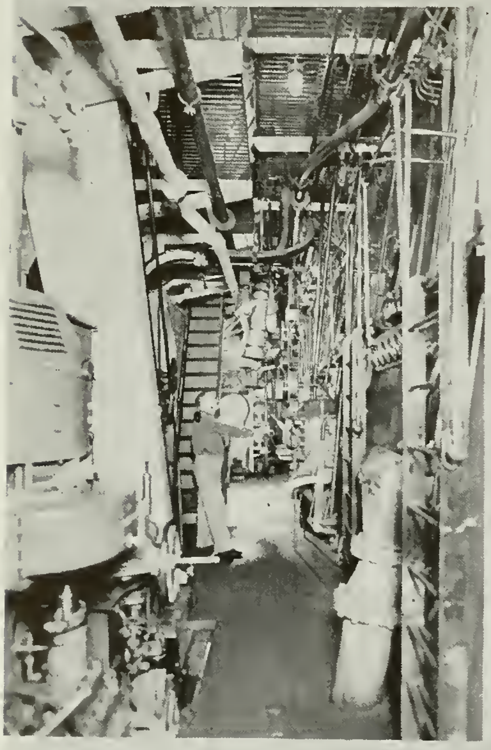
The exhaust manifold, attached to the backs of the cylinders, is built up of steel plate, welded, and is provided with three expansion joints. The exhaust is led to a waste heat boiler, connection to the boiler casing being made by means of a flexible plate joint.

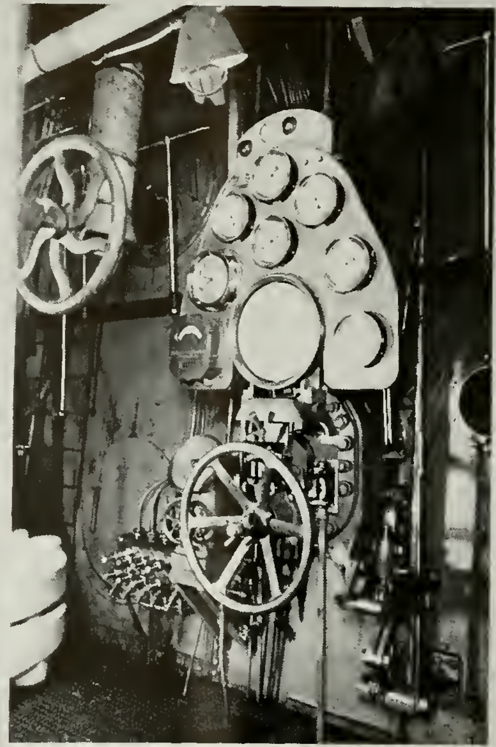
The crankshaft is of forged steel, built-up, and consists of four separate sections, one three-crank section for each working cylinder.

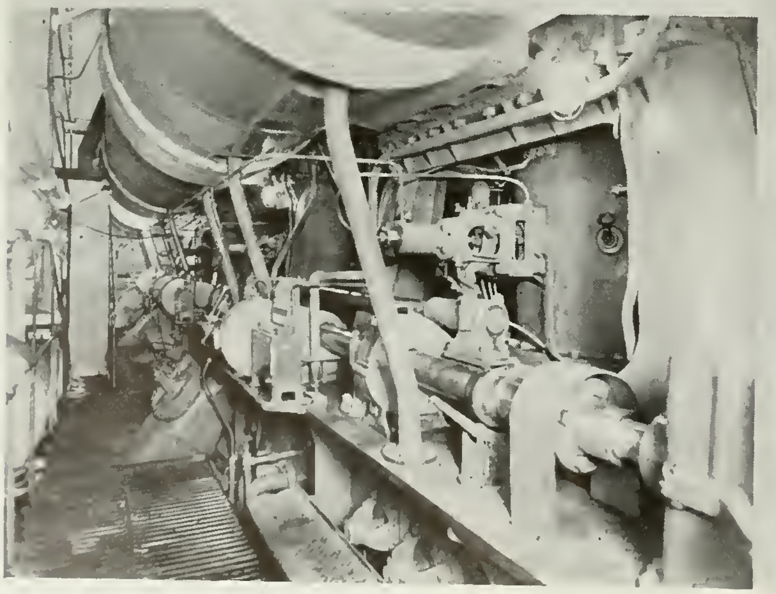
The working pistons are of cast iron, made in two parts, the skirts being bolted to the rods. The heads have concave crowns, so that when the pistons meet at end of stroke the compression space is of approximately spherical shape, and each is provided with five rings of the plain snap type. Each lower piston is attached by a short piston rod to a forged steel crosshead which works in the center guide. Connection to the center crank is by means of the usual marine-type connecting rod, the length of the rod being 3.82

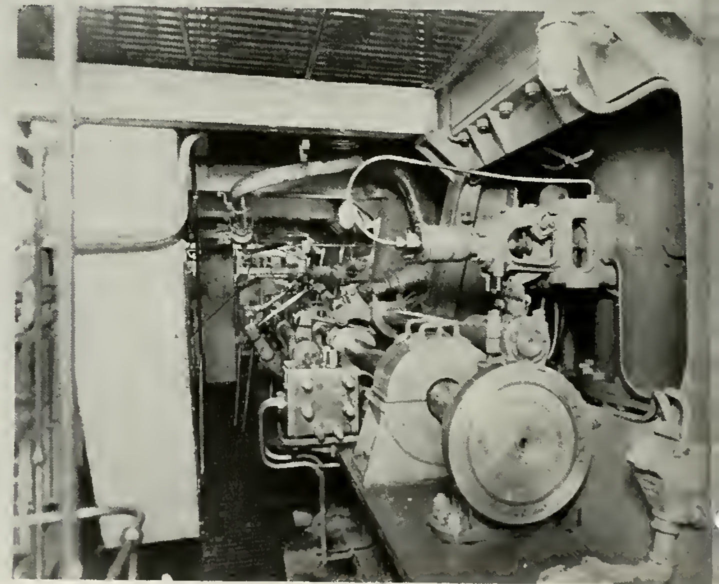












times the length of the crank throw.

Connection of each upper piston to the crankshaft is by means of a beam attached at its center to the piston and connected at each end to a side crosshead by means of a rod passing down through the cylinder entablature. The two side crossheads are connected to two cranks, one forward and one aft of the center crank, by connecting rods having a length equal to 5.62 times the crank throw. The pistons are fresh water cooled, the inlet and outlet connections being made to the crosshead of lower piston and crossbeam of upper piston by means of swinging arms and flexible rubber tubing.

●

Seven views in the engine room of the motorship Donald McKay. Upper left: Foster Wheeler waste heat boiler; upper right, dynamo flat, showing two of the three Cooper-Bessemer 230-K.W. auxiliary generating sets. Center, left to right: Working platform, showing engineer at controls; close up of control stand; upper platform, showing upper ends of cylinders. Lower: Two views showing camshafts port and starboard.

●

Two camshafts, one at the back of the cylinders and one at the front, are supported in bearings on top of the cylinder entablature and driven by gears and a vertical drive shaft from the crankshaft. The rear camshaft operates the rear injection valves and the brake valves, while the front shaft operates the front injection valves and the air starting valves. Reversing is accomplished through the medium of the front camshaft which is slidable in the direction of its length and provided with ahead and astern cams.

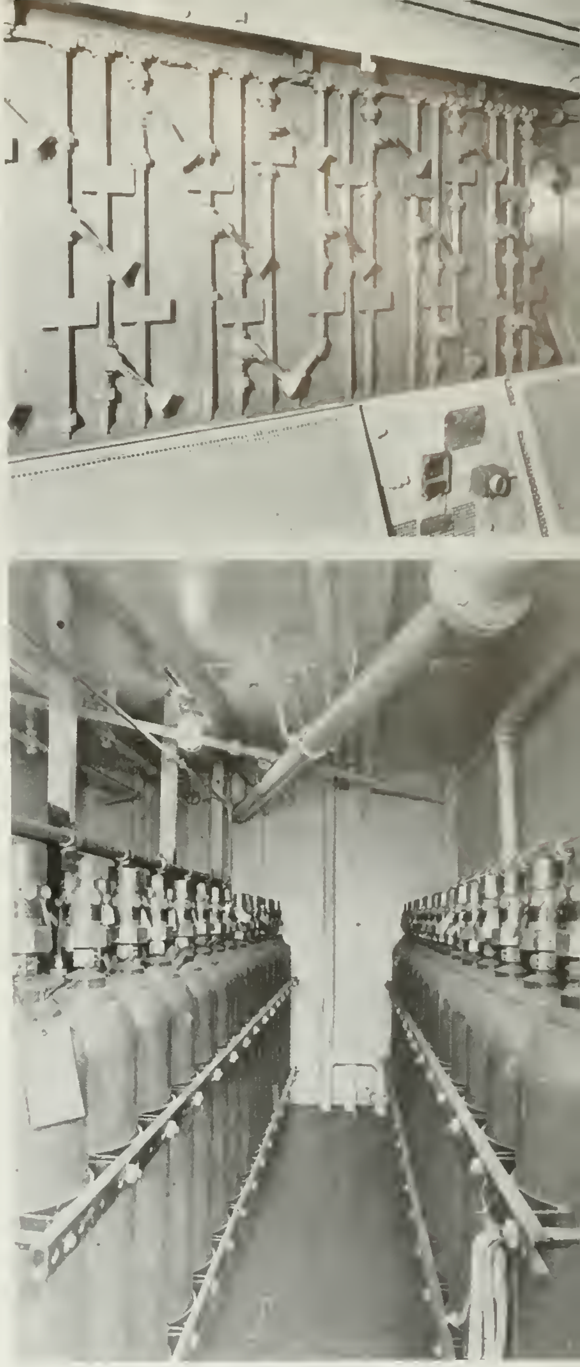
The rollers on injection valve levers bear directly on the cams, so that no push rods are required. The injection valves are of the balanced piston type and are attached to the cylinders so that the fuel is injected in horizontal sprays into the space between the pistons. It should be mentioned that the fan-shaped spray that was a feature of the original Doxford engines has never been used in the Sun-Doxford design. The spray nozzle used in the latter discharges through a circle of small holes, producing more of a cone-shaped spray. Its effectiveness was demonstrated on the Donald McKay engine by the colorless exhaust obtained at all speeds.

An interesting feature of the engine is the braking arrangement for stopping the engine quickly when maneuvering. Mounted in the rear of the engine above the camshaft is a group of valve boxes, one for each cylinder, in each of which is a piston valve operated by a cam on the camshaft.

The valve boxes are in communication with and control the operation of brake valves mounted on each cylinder. The cylinder valves are connected in pairs, each pair being in communication with two cylinders, the cranks of which are 180 deg. apart. The cams are timed so that when the valves are cut in during maneuvering, air is discharged to a diaphragm operating the cylinder valves. Both valves in the two cylinders whose cranks are 180 deg. apart are opened when the pistons are at the extreme ends of the stroke and the compressed air in one cylinder is allowed to fill the other cylinder in which pistons are at the outer end of the stroke.

Some of the compressed air escapes, but when the ports are sealed on the closing stroke a considerable volume of air is entrapped at a pressure in excess of the normal scavenge air. The final compression in the supercharged cylinder is higher than that employed for combustion. Releasing the compression in one cylinder on the expansion stroke and increasing the compression on the compression stroke of the opposite cylinder absorbs the inertia in the shafting and propeller, and brings the engine to a stop quickly. During the braking operation the fuel is cut out and no cold air enters the cylinders.

Fuel under constant pressure is supplied to the injection valves by four plunger pumps, assembled in a single unit at the after end of the engine and driven by gears from the thrust shaft. For maintaining pressure in the fuel lines before the engine is started a Watson-Stillman vertical, two-plunger pump, driven by a two-horsepower motor, is provided.



C-O-Two installation on motorship Donald McKay. Upper: The control board covering cargo compartments. Lower: A battery of cylinders.

Instead of the attached, crank driven scavenging pump characteristic of previous Sun-Doxford engines, two rotary type scavenging blowers of a new design are used.

Each blower has a capacity of 13,000 C.F.M. at three pounds pressure and is driven from the crankshaft through a Link-Belt Co. Quintuple Width Roller chain.

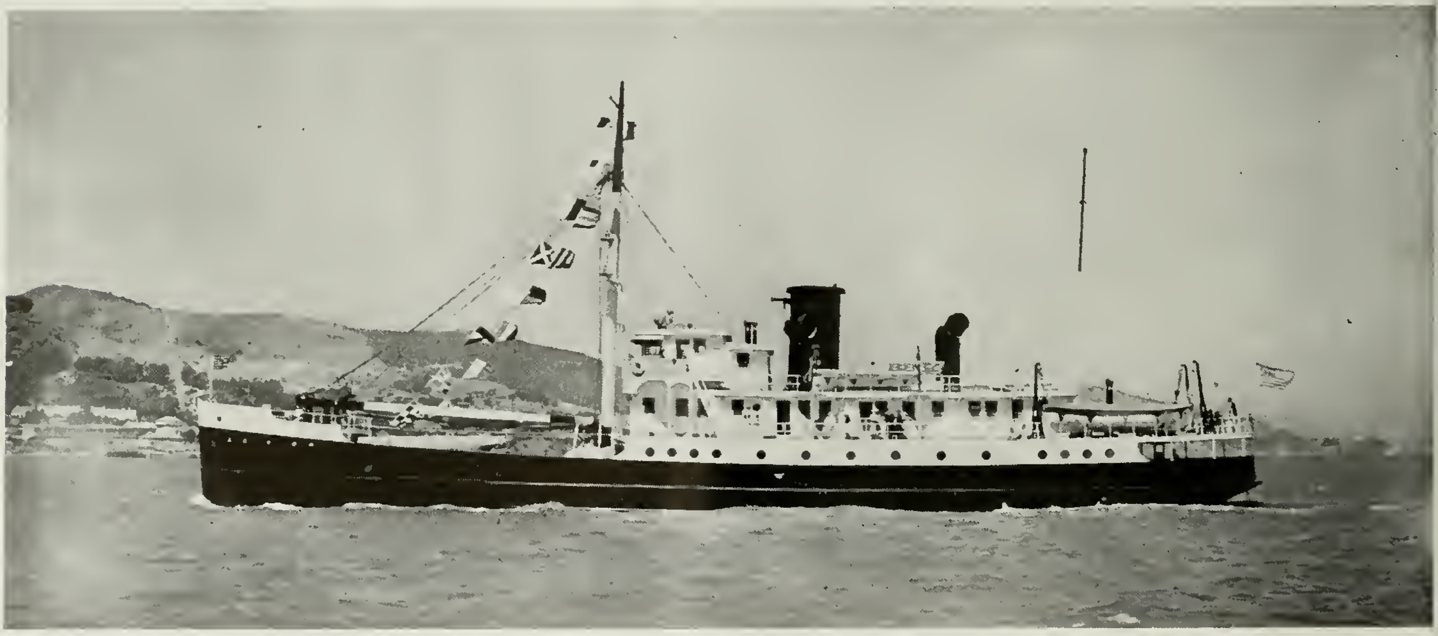
The U. S. Lighthouse

Details and Features of Two 174-ft. Steamers Built by the Moore Dry Dock Co., Oakland

The Moore Dry Dock Company of San Francisco and Oakland, California, on August 17, 1938, contracted to build two steamers for the U. S. Lighthouse Service. The first of these, the Walnut, is finished, has passed satisfactory trials, and is now on her way on a long ocean trip to be delivered at Detroit, Michigan. The second vessel, the Fir, is nearing completion and will be delivered at Portland, Oregon.

Hulls of these vessels are of riveted steel construction with following principal characteristics:

Length overall	174 ft. 10½ in.
Length waterline	163 ft. 6 in.
Beam molded	32 ft.
Depth molded	14 ft. 6 in.
Mean draft	10 ft. 7 in.
Displacement	827 tons



U. S. lighthouse tender S. S. Walnut in San Francisco Bay ready for her 7,300-mile shakedown cruise for delivery at Detroit, Michigan.

As these ships are to be used in lighthouse inspection work, their hulls are built to extra strong specifications. Forward their frames are narrowly spaced and the plating reinforced. Part of the duty imposed on such craft is tending to floating buoys. This often means replacing an injured beacon with a new one. For this purpose the Walnut and the Fir are each fitted with a heavy steel 20-ton capacity boom installed on the foremast and served by a Lidgerwood hoisting engine. Buoys are carried on the forward deck, and are eased over the side by means of this boom through an opening in the bulwarks port or starboard. In way of these openings the shell plating is protected by half-round chafing bars welded to the hull.

As will be noted from the illustrations herewith, these vessels are nicely fitted out along modern lines to take care of officers and crew. The galley and pantries feature a lavish use of Monel metal. Ample capacity in Frigidaire refrigeration is installed to assure preservation of perishable foodstuffs. A large capacity oil burning Shipmate range affords the chef ample scope for his culinary talent. Tiled baths and showers are installed in the quarters and all plumbing fixtures are Crane. Sanitary enameled steel wardrobe lockers of the "Aurora" type, manufactured by the All Steel Equipment Co., are installed in all bedrooms. Dahlstrom steel doors are fitted throughout quarters.

In navigating equipment these vessels are equipped like large passenger vessels. Each has a Sperry Master Gyro compass and three Sperry Repeaters, one in the pilot house and one on each wing of the

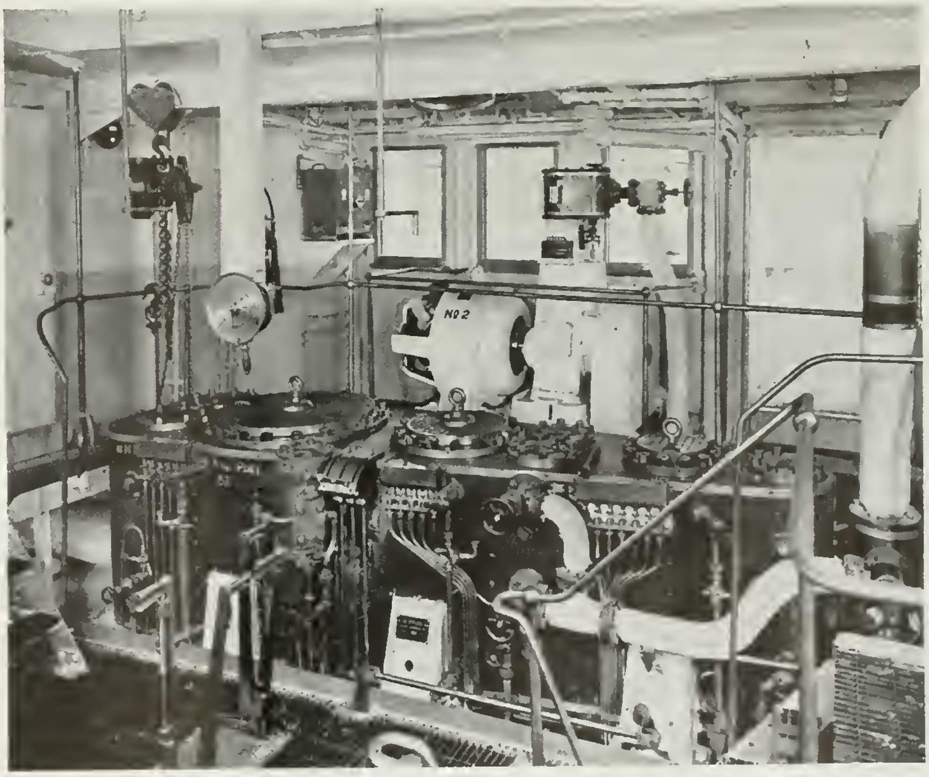
Tenders Walnut and Fir

open bridge. A Fathometer is installed in the pilot house. Other items of equipment on the bridge and in the pilot house are: McNab engine revolution counters; McNab engine shaft direction indicators; Ashcroft American Thermometers; windows by the Kearfott Engineering Co.; a U. S. Navy standard compensating binnacle by E. S. Ritchie and Son, and engine room telegraphs by Kirk Habricht.

Propulsion Equipment

The propulsion equipment on each ship comprises twin screws each directly connected to a triple expansion steam engine taking steam from two oil burning water tube boilers served by the usual steam driven pumps.

The boilers are Combustion Engineering Company marine type water tube steam generators oil fired through Todd burners. Each boiler has 2180 square feet of heating surface and generates steam at 225 lbs. gage pressure. Main propulsion engines have cylinder bores of 11½ inches, 19 inches and 32 inches, with a common stroke of 24 inches, and develop 500 shaft horsepower on each engine. These engines were built by the Moore Dry Dock Co.



Seldom does the modern American marine engineer get a chance to observe a new triple expansion steam engine such as this neat prime mover in the engine room of S. S. Walnut.

Both engines exhaust into a Worthington condenser served by a Worthington steam reciprocating beam air pump and by a Worthington centrifugal circulating water pump driven by a Troy 7 inch by 7 inch steam engine that develops 18 B.H.P. at 455 r.p.m. The feed pumps for the boilers are also Worthington reciprocating pumps. Steam line valves are Crane; reducing valves are Leslie.

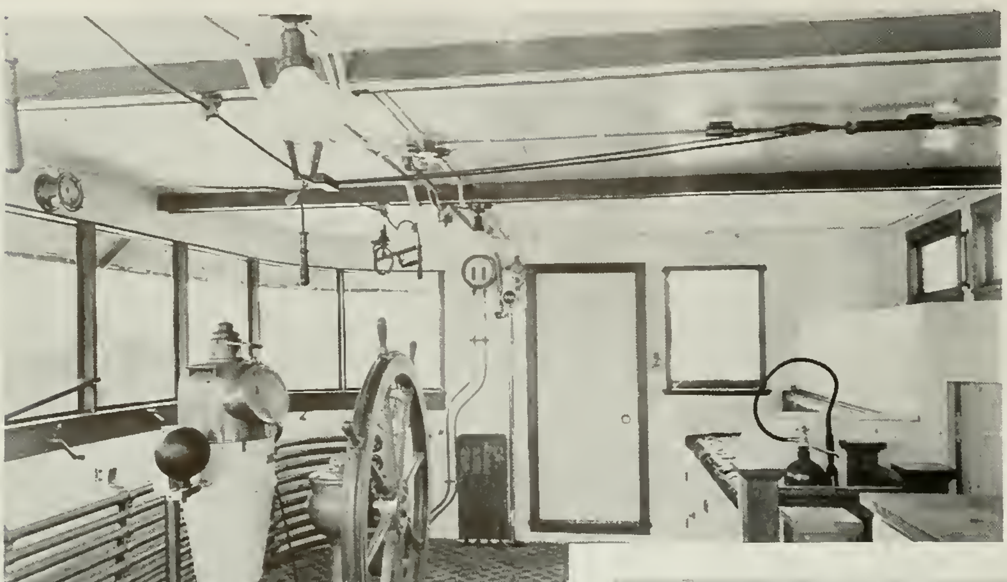
Over each engine a 1½-ton Hercules chain hoist is installed on a trolley running on a beam.

On trials in San Francisco Bay this plant drove the Walnut at better than 12 knots.

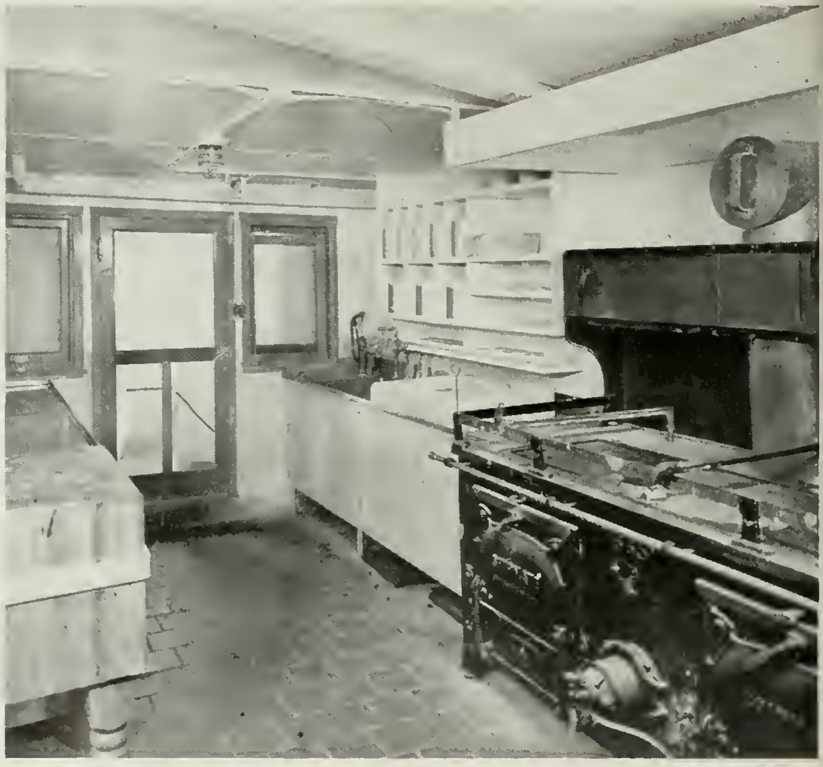
Electric energy for lighting and communication is provided on each ship by two Troy-Engberg 12½-k.w. steam reciprocating drive generating sets. These are direct connected direct current sets, and the generator is compound wound so that a 100-volt storage battery can be floated on the line. The steam engine on these sets is an 8 in by 6 inch vertical single cylinder engine operating on 90 lbs. steam and exhausting at 10 lbs. back pressure. The Engberg generator of this set delivers 12½ k.w. at 110-135 volts.

The storage battery is a 54-cell unit Type M.V.M. 15 Exide Iron Clad with a capacity of 196 ampere hours at 8-hour rating.

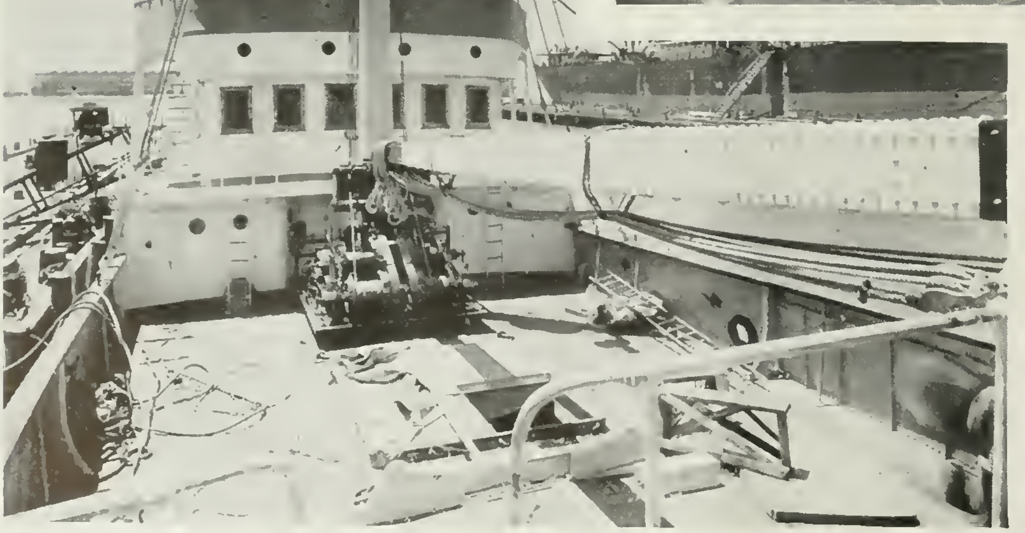
Arrangement of machinery in the



The pilot house features Kearfott windows, a Sperry Gyro Compass repeater, Lidgerwood steam steering engine control, a standard magnetic compass binnacle.



In Walnut's galley there is lavish use of Monel metal trim, a Shipmate range, Frigidaire refrigerator, and a neat floor of ceramic tile.



Forward deck of S. S. Walnut, featuring 20-ton boom and Lidgerwood compound steam winch for handling buoys and beacons.

engine room space provides easy access for adjustment and repair to all items of equipment.

An interesting item in the steam equipment is the starting boiler provided by the Moxley Oil Burning Equipment Company of Hoquiam, Washington. This provides steam for operating the feed pumps and fuel oil transfer and oil burner pumps for the main boilers when starting from cold.

Practically all of the service pumps are Worthington, including fire and bilge, fresh water, sanitary water, and fuel oil transfer pumps.

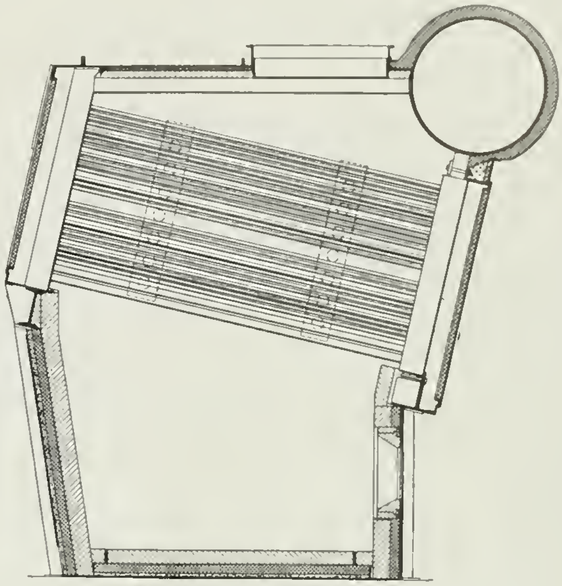
Engine and boiler room are covered with a Walter Kidde Lux C.O.$_2$ fire extinguishing system. Schutte-Koerting heaters provide hot water for officers' and crew's quarters.

The steering engine is a Lidgerwood steam job. Hyde Windlass Company provided the steam windlass and the steam capstan.

Seldom does a vessel have such a shakedown and delivery cruise as is being given to the steamer Walnut. Seven thousand three hundred and thirty-seven (7,337) miles of ocean, canal, river and lake stretch out before this small steamer on her way from the Golden Gate to Detroit, Michigan. Her cruising radius as designed is somewhat limited and so she must stop to refuel at Manzanillo, the Panama Canal, Boston and Farther Point (near Quebec). She leaves the Caribbean via Windward Island and Crooked Island passages. Manned with a total complement of 29 men, she will be 34 days on the trip, averaging about nine knots.

Engineer John Duffy of the U. S. Lighthouse Service is aboard the Walnut as observer. In addition to his observation of the operation of the ship, he will carry on a series of tests on bearings from the radio-beacon stations of the Lighthouse Bureau, which should afford valuable information on this method of navigation.

Construction of the Walnut and the Fir is under the supervision of T. P. Fowler, Superintendent of Construction for the Lighthouse Bureau. W. H. Griffin and W. P. Manuel are inspectors for the bureau, covering respectively the hull and the machinery.



Combustion Engineering boiler on Walnut and Fir.

The Challenge Makes Good!

(Continued from page 21)

is passed; the flue gases flow outside of the tubes.

The general advantages attributed to this type of marine steam generator include:

Maximum absorption of radiant heat in the furnace.

Minimum loss of heat by radiation.

Superheater accessible for external cleaning from the furnace, if necessary.

Maximum heat recovery from furnace gases through the combined use of economizer and air preheater in series.

Fourteen mechanical soot blowers insure cleanliness.

The effective operation of such a unit must necessarily result in high efficiency, and the trial runs of this steamer showed flue gas temperatures in the neighborhood of 260 deg. F. at normal rating. The efficiency guarantee of 88 per cent was well exceeded.

Mechanical draft is provided through the use of forced draft fans which blow the air for combustion through the air heater and down across the end of the casing to the burners. Careful provision is made for a cool fire room in the heavy insulation with which the steel casing of the boiler units is lined. Ample refractory is used where the gas temperatures are high, and two grades of insulation used between it and the steel paneling.

Our Cover

Our cover this month carries a fine broadside view of S. S. Challenge at sea on her builder's trials. She has a trim, shipshape appearance, with good sheer, and a well-molded cruiser stern. Named for the famous American Clipper Challenge, she is starting with a good background for commercial success. That sailing ship is said to have netted her cost from the proceeds of her first round voyage.

PACIFIC NORTHWEST MARINE REVIEW

Some Notes on the Events of the Month in and Around Puget Sound Ports

● P. N. O. Line Fades Out

The much-publicized and long-anticipated Pacific Northwest Oriental Steamship Line has been eliminated by labor difficulties. After a series of delays, conferences, proposals and counter proposals during the last week in June, when the first freighter of the line was held up by picket lines, the demands of the Sailors' Union of the Pacific were flatly refused by the Maritime Commission and a week later the Commission canceled its contract with the P.N.O. Line Agency. The Sailors' Union demanded union hiring halls for sailors on Maritime Commission ships. The Commission demanded open hiring through the U. S. Shipping Commissioner, according to existing Federal statutes covering employment of crews in overseas shipping. Neither side yielded, and after endless palaver the whole deal was canceled. L. L. Bates, manager of the P.N.O. Line, has dismissed the staff and practically closed the offices. The freighters Coldbrook and Satartia are now idle.

● Defunct American Mail Line Revival Plan Pushed

Following within three days from the foldup of the Pacific Northwest Oriental Steamship Line came a plan on July 15 for rejuvenating the American Mail Steamship Line. Two freighters would be placed in service promptly. This line still controls five of the 535 type transpacific President liners and this fleet would be sold or traded for new ships. The President Madison would be put up for sale, the proceeds to become working capital. The Presidents Jackson, Jefferson, Grant and McKinley would be returned to the Maritime Commission to clear the Government's obligation and act as a down payment on new cargo vessels. Issuance of $2,000,000 capital stock would be made, in shares of $10 each. Sailors would be hired through the union halls. The new plans were filed in Federal Court and would call for distribution of $550,000 Class A voting stock to satisfy all creditors of the former American Mail Line. Seattle creditors of the line are primarily behind this plan.

● Tyee Finished

The S. S. Tyee, second of the former Moore and McCormack Atlantic Coast ships to enter the services of the Alaska Transportation Company, was finished July 20 and turned over to her owners. Work was carried out under supervision of W. C. Nickum Sons of Seattle, and was identical in every respect to work done on the Taku, reported in May Pacific Marine Review. The new ship has been entirely rebuilt at a cost of over $50,000. Refrigerated cargo space was installed. A small, but de luxe type passenger lounge and nicely-equipped passenger accommodation were fitted. She will call regularly at many smaller Alaska ports.

● Explorer Launching in August

The Geodetic Survey ship Explorer, now building at Lake Washington Shipyards, is the largest steel vessel built in the Northwest since the Southern Pacific Railroad's Bienville in 1923. She is being speed-

A Puget Sound purse seiner and her engine room. The vertical chains are for mechanical control of power plant from pilot house.

S. S. Tyee, latest addition to the fleet of the Alaska Transportation Company.

ily assembled and will be launched late in August. This ship is being constructed under supervision of W. C. Nickum. She is 221 feet overall by 38 feet beam by 23 feet depth, and will be driven by a 2,000-h.p. De Laval steam turbine taking steam from a pair of Babcock & Wilcox boilers. Equipped with an elaborate layout of special survey equipment, she carries a crew of 95. A Fathometer and Sperry Master Gyro Compass with three repeaters are important items in her navigation equipment.

● Moore Fabricates Steel for Caisson

The huge 148-foot by 27-foot by 54-foot steel caisson gate now being built at the Winslow Marine Railway on Bainbridge Island will be constructed of steel fabricated at the Moore Dry Dock Co. in Oakland, California, and brought North by boat. More than 1,000 tons of steel go into the gate, and it has a pair of heavy duty Worthington turbine pumps with a capacity of 8,000 gallons per minute, and powered with two 50 h.p. General Electric 440-volt motors.

● Todd's New Seattle - Tacoma Shipbuilding Co. Second Low

Bids for the C-1 ships that were opened on July 11 by the Maritime Commission show that Todd Drydocks, Inc., Seattle, operating through their new subsidiary, the Seattle-Tacoma Shipbuilding Corp., were among the low responsible bidders, and that this firm has a good chance to get a contract for some of these vessels. The bids are listed on page 44 of this issue.

Hulls would be built at Tacoma and finish work would be done in the Seattle Todd plant. Wage scales have been fixed at 5 per cent higher than the prevailing San Francisco scale. A telegram received by the Northwest correspondent of Pacific Marine Review on July 21 from Admiral Land of the Maritime Commission advises that the "Commission was giving priority to the lowest bids in sequential order," and that no definite decision was reached as of that date.

● J. H. Pohlemus Launching Soon

The 84-foot by 21-foot by 10-foot U. S. Engineer dredge tender J. H. Pohlemus, another Nickum-supervised ship, will be ready for launching early in August at the Seattle Shipbuilding Co. Her propulsion unit will be a 350 shaft horsepower, directly connected, fully reversible diesel engine built by the Enterprise Diesel Engine Co. of San Francisco. She will be used on the Columbia River, and is named after the former chief engineer of the Port of Portland.

● Terminal Trade Pact

On July 12 the U. S. Maritime Commission gave official approval to agreement Number 6785, which is the basis of the Northwest Marine Terminal Association.

The agreement involves eight northwestern ports, many operating firms and three ship lines maintaining terminals in the affected areas. It is signed by W. C. Bickford, for the Port of Seattle; G. W. Osgood, for Tacoma; Ernest Gribble, for Olympia; W. J. Murphy, for Grays Harbor; L. D. Williams, Jr., for Willapa; T. P. MacComber, for Vancouver, Wash.; O. E. Beebe, for Bellingham; H. W. Davies, for the Port of Port Angeles, and by several agencies for the Port of Portland. In addition, American-Hawaiian, Luckenbach and McCormick Steamship Companies are signatories.

Under the conference set-up the parties will assess and collect all terminal rates and charges in connection with traffic handled strictly in accord with agreed-upon applicable tariffs. No deviation from or violation of these tariffs will be permitted, especially no refunds by any device. All tariffs effective under the agreement, containing rates, charges, classifications and all changes thereto, will be filed with the Maritime Commission through the association secretary.

Any party violating the agreement will be subject to a fine determined by vote of trustees of the group, which are to be eleven, three from Seattle, three from Portland, two from Tacoma and three from other affected ports. This fine, in tariff violation matters, shall be no more than ten times the difference between the charged rate and the proper one, but may not be less than $100. A surety bond of $1,000 is required from each participating organization and trustees will employ auditors to make regular inspections of all firms' books to insure adherence to terms of the agreement.

Ammonia Refrigeration

ON THE BABY TUNA CLIPPERS

By **DAVID W. DICKIE**
Naval Architect and Marine Engineer

The baby tuna clippers are the boats ranging in length from 85 to 100 feet overall, most of which, due to narrow beam, are deficient in stability while loading at sea. When a well in the hold on one side was emptied for cleaning they invariably got into difficulties. The remedy was to make the wells smaller; that is, to put 4 wells in the length where originally there were 3, and 5 wells in the length where originally 4 were fitted.

The wells ranged in size from 20 to 32 tons of sea water and with six wells in the hold aggregated about 142 tons. Dividing this amount into eight wells (four on each side) reduces the size of each well to about 18 long tons or 20 short tons. As the capacity of the refrigerating plant is governed by the size of the largest well a reduction from 32 to 18 tons not only makes a material saving in plant but in the power required from the auxiliaries.

If the wells are retained at the large sizes formerly fitted in the vessels the refrigerating plant has to be increased in capacity to an extent that the extra weight of machinery seriously reduces the carrying capacity of the boat. The reason is that it takes less plant to freeze a small well than a large one and once it is frozen it takes comparatively little freezing capacity to keep the temperature down where it belongs. The owner has one of two choices: either reduce the size of the wells on the boats already built or spend more money for refrigeration and auxiliary generators and suffer loss of carrying capacity.

At the time of the stability difficulties the boat owners objected to changing the size of the wells on account of the cost. However, they had to empty two wells, one on each side of the boat, when it was necessary to clean any one well after having carried bait in it.

The ice storage boats in some instances lacked stability but the cause was insufficient beam and heavy weights too far above the keel. All of which means that it is vitally necessary to put machinery on deck if the machinery is of less weight than the brine which would fill the same space below deck.

The best average temperature obtainable for fish packed in ice and salt is about 28 degrees Fahrenheit, so the problem of catching tuna and storing it in ice did very well so long as the boats were within 10 to 15 days' steaming radius of the home port from the time of catching the first fish. A longer time interval between catching the fish and delivering them to the packing plant meant uncertainty in delivering a prime edible product.

The ice storage boats were fitted with about 2500 lineal feet of 1¼" cooling coils in the hold, but this was insufficient to make any material reduction in the cargo temperature.

One fisherman informed the writer that he had fished for tuna 1000 nautical miles west of the Galapagos Islands, so he was about 2400 nautical miles from San Diego before he started home. As it took several days to fill the boat it was about 24 days from the time he caught the first fish until he arrived home, obviously beyond the time limit for carrying fish in crushed ice.

● Structural Problems

Latterly a number of the boats were built with watertight wells to see if storage in brine was practicable for longer voyages. The refrigerating engineer installed the largest plant the fisherman would pay for, with the result that some of the boats had less than half the necessary freezing capacity. Furthermore, when an attempt was made to correct the error the auxiliary generator sets were too small, which added to the trouble.

Obviously it takes larger freezing capacity to remove the heat necessary to maintain a temperature of from zero to ten degrees Fahrenheit attendant upon the use of brine than with crushed ice at 28 degrees Fahrenheit. Also the lower temperature necessitates an increase in the thickness of the insulation. Three inches of cork insulation is satisfactory for 28 degrees, but for 0 to 10 degrees Fahrenheit 5 inches of cork is necessary and 6 inches is preferable.

If the ceiling and bulkheads are surfaced on the side away from the cold brine and painted with a white glossy or aluminum paint, some of the radiation into the brine can be avoided. It is extremely important to paint the spaces between the beams and frames with an approved disinfecting paint while laying the deck and planking the outside of the boat on account of the rot and fungus growth.

The ceiling beneath and the deck above the beams form a cellular construction between the beams. The air is free to circulate through these spaces except at the hatches that pass down through the deck to the brine wells. Where air circulation is interrupted by the hatches, deck plates should be fitted so the fungus growth can be cleaned out by washing with a strong solution of tri sodium phosphate at the end of every voyage.

Unfortunately there seems to be no method of insulating the ceiling and bulkheads of a wood boat so they will be free from freezing in the interstices at zero degrees Fahrenheit. The only remedy is to fit at least 5" and preferably 6" thickness of ceiling and bulkheads and thereby have 5 inches to 6 inches of wood for insulation. Where double ceiling is fitted, freezing takes place between the thicknesses on account of the seepage through the wood. This draws the fastenings and ruins the strength of the structure.

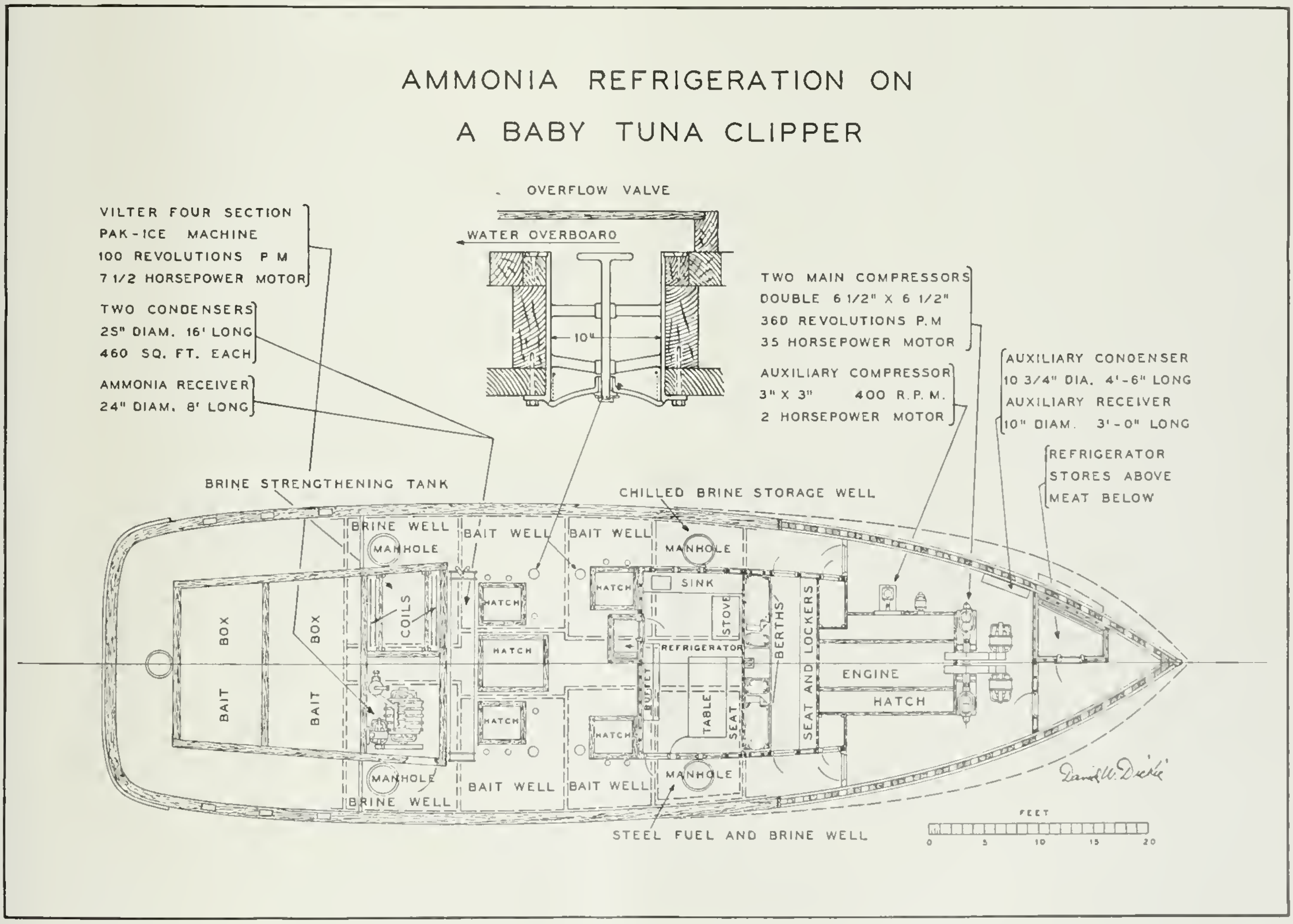
The refrigeration authorities are agreed that where fish are to be kept for a longer time than six months they should be frozen quickly to a temperature of —50 degrees and held at that temperature, but for a period of time between 1 and 6 months they must be subjected to a freezing temperature of from 0 to —5 degrees Fahrenheit for 1 to 2 days to get rid of the body heat and thereafter must be held at a constant temperature of from +5 to +10 degrees for the remainder of the voyage. On land, where it is practicable to keep the temperatures constant, they can be stored dry and if so stored the surrounding air should be circulated with a fan once in 20 minutes and the humidity of the storage room kept at from 74% to 79%. This is impossible on the tuna boats.

● Carriage in Brine

The best method of carrying fish on the boats is in brine and slush ice. The slush ice is made with a Vilter Pak-Ice machine, which consists of an outside and inside shell with ammonia gas at low temperature in the jacket between the shells. The brine is within the inner shell, and as the heat passes through the wall of the shell from the brine to the ammonia gas a film of snow freezes on the surface of the shell that is between the ammonia gas and the brine. The snow is scraped off by a rotary scraper and is carried in suspension in the brine to the storage well. The brine is circulated continuously between the storage well and the Pak-Ice machine, accumulating snow as it completes each cycle.

The ammonia gas with its attendant heat is piped from the jacket of the Pak-Ice machine to the ammonia compressors, where it is compressed and delivered under pressure to the condensers. It is condensed by circulating sea water in the tubes of the condenser and delivered in a more or less liquid state to the receiver. The ammonia liquor flows from the receiver to the Vilter Pak-Ice machine, where it is liberated through an expansion valve in a more or less gaseous state to the ammonia jacket of the machine.

One of the wells of the boat is nearly filled with clean sea water obtained outside of the harbor to avoid contamination from sewage. The Pak-Ice machine builds up brine and slush ice for storage in this well. About 18% of salt is added to the sea water, making a 20% to 21% solution, and the temperature is reduced to zero degrees Fahrenheit.


AMMONIA REFRIGERATION ON A BABY TUNA CLIPPER

OVERFLOW VALVE
WATER OVERBOARD
10"
VILTER FOUR SECTION PAK-ICE MACHINE 100 REVOLUTIONS P M 7 1/2 HORSEPOWER MOTOR
TWO CONDENSERS 25" DIAM. 16' LONG 460 SQ. FT. EACH
AMMONIA RECEIVER 24" DIAM. 8' LONG
TWO MAIN COMPRESSORS DOUBLE 6 1/2" X 6 1/2" 360 REVOLUTIONS P.M 35 HORSEPOWER MOTOR
AUXILIARY COMPRESSOR 3" X 3" 400 R.P.M. 2 HORSEPOWER MOTOR
AUXILIARY CONDENSER 10 3/4" DIA. 4'-6" LONG
AUXILIARY RECEIVER 10" DIAM. 3'-0" LONG
REFRIGERATOR STORES ABOVE MEAT BELOW
BRINE STRENGTHENING TANK
CHILLED BRINE STORAGE WELL
BRINE WELL
MANHOLE
BAIT WELL
BAIT WELL
MANHOLE
BOX
BAIT
BOX
BAIT
COILS
HATCH
HATCH
HATCH
HATCH
HATCH
SINK
STOVE
REFRIGERATOR
BUFFET
TABLE
SEAT
BERTHS
SEAT AND LOCKERS
ENGINE
HATCH
MANHOLE
BRINE WELL
BAIT WELL
BAIT WELL
MANHOLE
STEEL FUEL AND BRINE WELL
FEET
0
5
10
15
20

A brine strengthening tank is provided to make up brine and partially precool it to replenish the storage well when its contents have been used to fill another well; also it is used to chill sea water for refilling any well after it has been pumped partially dry to permit packing with fish previous to freezing.

The well where the fish are to be stowed is partially filled with sea water and reduced in temperature to about 28 degrees Fahrenheit by circulation through the Pak-Ice machine. As the fish are caught they are tossed into the slush ice and brine in the well. When the well is full of fish loosely stowed the sea water is pumped overboard, thereby disposing of a large part of the blood and gurry that leaches from the fish.

The fish settle to the bottom in the snow and the well is filled with fish up to about 6 inches from the top. The space above the fish is necessary because the crystallized ice particles regelate and expand at the low temperatures. The well is then filled with brine from the storage well and frozen. The brine from the strengthening tank is used to prime the storage well for the succeeding cycle. The brine from the storage well is diluted by the sea water, so sufficient salt has to be added to make a 20% to 21% solution to get the benefit of the low freezing point as it is being circulated through the Pak-Ice machine. Cooling of the fish for the homeward voyage is brought about by continued circulation of brine which enters at the top at zero degrees and is drawn off at the bottom at +10 degrees Fahrenheit and sent back to the Pak-Ice machine to be cooled again.

Care has to be taken to avoid getting more than 22% of salt in the brine, as above 23.8% there is danger of clogging the system with salt as it precipitates out of the brine. The manufacturers are bringing out a new design of salometer that gives the temperature and percentage of salt reading direct. With this instrument the only salometer correction that will have to be made will be for variations of temperature.

There are other methods used for storing fish, but the foregoing is the most practical.

● Use of Cooling Coils

Nothing is gained by the use of cooling coils in the wells, as the authorities are agreed that where fish are stowed either in crushed ice, or snow from the Pak-Ice machine without brine, the temperature of the fish varies with the temperature in the coils.

It is practically impossible to maintain constant temperature in the coils, because the sea water used to cool the ammonia varies in temperature from 90 degrees in the equatorial current to 55 degrees in the Japan current coming down the Pacific Coast from the north. The tuna inhabit the warm water. With the changes in temperature the moisture in the fish expands and contracts, destroying the structure of the meat.

Carrying the fish in brine and crushed ice is not as sensitive to variations in coil temperatures as where the brine is drained off the cargo. There is a difference in time lag; that is, it takes a little longer in the latter case for the variations to be reflected in the temperature of the fish.

The installation of a tubular cooler as a heat exchanger between the ammonia and calcium chloride brine and circulating the brine in the coils in the wells dampens the temperature variations in the wells but only adds complications without eliminating the difficulty entirely. Also it means two brines, calcium chloride in the coils and sodium chloride in the wells. The reason calcium chloride is used in the coils is because it is less liable to freeze at the low temperatures.

The tuna are lured to the boat by the use of sardines or pilchard for bait. These are caught with a lampara net and stored alive in the bait tanks on deck aft and in four of the wells of the eight-well boats. Sea water is circulated constantly from the sea to the bottom of the bait wells and tanks and overboard through a large valve in the deck.

After the bait is exhausted from one of the bait wells it has to be thoroughly cleaned and washed with tri sodium phosphate before it is prepared with brine or sea water to receive the tuna cargo.

● Typical Refrigerating Plant

The drawing shows the refrigeration plant for a typical baby tuna clipper which was laid out to fit the carrying capacity of the boat. The wells in the hold of the boat have been reduced in size to fit the designed capacity of the plant and the boat is designed to suit the carrying of the fish cargo when cooled to the proper carrying temperature. All ammonia apparatus has been put on deck to reduce to a minimum the danger from the toxic effect of the gas.

Actual observations of sea water Fahrenheit temperatures in the current where the vessels fish for tuna give for January, February and March average, 80 degrees; April average, 84 degrees; May, June, July and August, 86, 88 and 90 degrees; September, 87 degrees average; October and November, 86 to 85 degrees average; December, 83 degrees average.

As the fish have to be cooled to zero degrees and carried at +5 to +10 degrees, the plant is designed to use a suction pressure of 5 pounds gage (—17.2 degrees ammonia temperature). When the sea water used for condensing has a temperature of 90 degrees the plant can be run at overload, but ordinarily the plant is designed to use 86-degree sea water. To get the cooling effect of a difference in temperature between sea water and ammonia the compression pressure must be at least 185 pounds gage (96 degrees ammonia temperature).

The capacity of the installation rated at 5 pounds gage suction pressure and 185 pounds discharge pressure, using sea water at 86 degrees Fahrenheit for condensing, is 13 short tons of ice-making capacity per 24 hours for the two 6½″ x 6½″ double-cylinder ammonia compressors turning 360 revolutions per minute.

The four-section Pak-Ice machine has a rating of from 35 to 14 tons of ice-making capacity per 24 hours, but the capacity is reversed with respect to the capacity of the ammonia compressors. When the sea condensing water is colder than 86 degrees and the initial and final temperatures of the brine are higher the Pak-Ice machine is less efficient and the ammonia compressors are more efficient than at the conditions which have been laid down as basic for the plant. Therefore, to take care of the preliminary conditions of cooling, a Pak-Ice machine has to be used that is larger than is necessary for the basic conditions.

The plant is based on cooling one well having a volumetric capacity of 20 short tons of 22% sodium chloride brine from 86 degrees down to zero degrees Fahrenheit, which is equivalent to about 12 short tons of ice-making capacity per 24 hours when allowance is made for cooling the walls of the well.

On account of the high sea water temperatures and the fact that the 1½" tubes of the condensers plug up with marine growth every voyage, it is necessary to figure on at least one square foot of condensing surface per cubic inch of total cylinder volume of the compressors. Also there should be about one gallon of sea water circulation per minute per square foot of condensing surface.

It is possible to clean the condenser tubes by means of a solution of hydrochloric acid, but this should be done under the supervision of a qualified chemist to get the correct proportions. The Monsanto Chemical Company is making a search to find, if possible, a chemical that can be fed into the circulating water system to prevent the accumulation of marine growth and at the same time not injure the metals of the various units of the system.

As the refrigeration capacity is about 1.6 times the ice-making capacity on account of the extraction of the latent heat in the latter case, the plant has ample refrigeration capacity to hold the temperature of 180 short tons of fish for the voyage home from the fishing grounds.

One well built of nickel-clad steel carries diesel fuel oil for use on the outbound voyage. Before the fuel well can be used for storing fish on the homeward voyage it has to be cleaned with hymolal salt. This commercial salt is highly concentrated and should be diluted with sea water before being used. It is recommended that the crew use rubber gloves while working with it.

● Record of Temperatures

In previous articles the writer has stressed the importance of keeping a proper record of temperatures. Where fish are carried in brine and slush ice there is no humidity record to be kept, so a simple temperature recording instrument is sufficient. The best instrument is one having a one-day circular card that is changed at midnight when the ship's clocks are corrected. A thermo-couple is located in the brine outlet of each storage well and wired to the recording instrument in the engine room. The instrument has to be mounted on springs in a shockproof frame to avoid inaccuracy from the vibration of the ship. A connection should be made to take the temperature of the sea water before it is circulated in the condensers. The deck department should take the wet and dry bulb readings and the barometric pressure.

In addition to the refrigerating plant for the cargo the vessels are fitted with an auxiliary unit for the meat, stores and galley ice boxes.

It consists of a 3" x 3" single cylinder compressor turning 400 revolutions per minute operating at 20 pounds suction pressure, 185 pounds condenser pressure, and has a capacity of one ton of refrigeration per 24 hours.

The above compressor will serve about 400 lineal feet of 1¼" pipe coil, 20% of which is for the small box and 80% for the other. The coil in each case is placed on one side of the box enclosed with a sheet of laminated board. At intervals the coil is baffled alternately from each end and a small fan in the top of the box circulates the air within the box over the coil and out at the bottom.

To save space in the reefer boxes it is advantageous to use a smaller coil of ½" or ⅝" diameter tubing fitted with fins. Several of the companies have such units fitted with a fan complete. The finned coil is less efficient than a bare coil, so the surface area has to be greater. To minimize the frosting of the finned coil the compressor should be operated at about 270 revolutions per minute, 35 pounds suction pressure and 185 pounds condenser pressure to maintain the capacity of one ton of refrigeration per 24 hours. Peerless of America Company manufactures a combined unit fitted with a blower in which the external surface of the coil is worked into wires like a tubular brush. Provision has to be made for cleaning the special type coils and the manufacturer's ratings have to be reduced to meet the rigorous tropical conditions.

The condenser has about 29 square feet of condensing surface and the receiver holds about 100 pounds of ammonia.

The reefer boxes should have at least 4" thickness of cork and should be lined with zinc soldered watertight to avoid trouble from the defrosting necessitated by the high humidity (95%) of the atmosphere in the tropics.

Literature of the Industry

● **V-Belt Data Book:** For machine designers and engineers designing V-Belt drives, The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., has just published a new engineering data book.

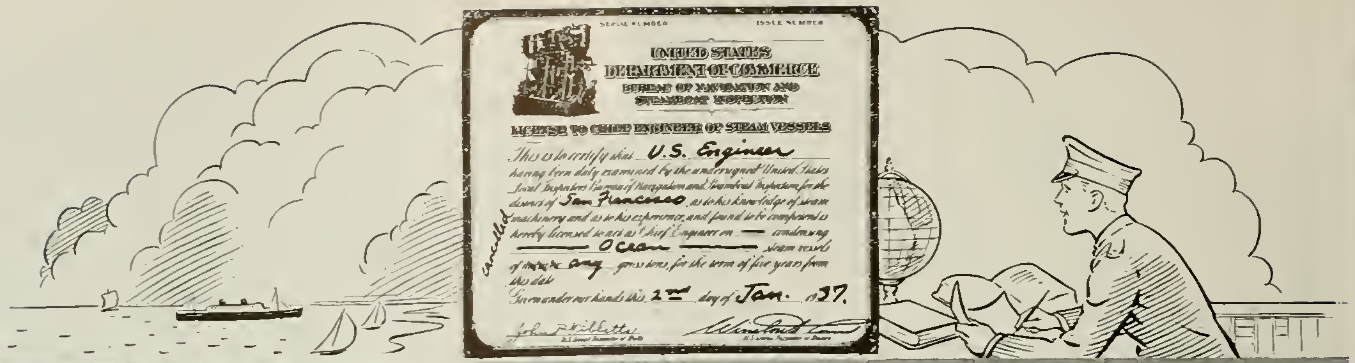
The book is divided into two parts. The first part covers standard drives, eliminating the necessity of working out calculations; and the second, sheave factors for designing new or special drives. It also contains belt comparison tables and other general information. Engineers, designers, jobbers and instructors may obtain the book by writing this magazine.

● New One--Hand Fire Extinguisher

An interesting development in the fire extinguisher field is announced by Walter Kidde & Company. This company is now placing on the market a new two-pound portable carbon dioxide fire extinguisher under the trade name Kidde-LUX.

This extinguisher features a pistol-grip handle and a trigger-control valve. The discharge horn is self-locking in any one of several positions according to the location of the fire. Fingertip control and balanced one-hand operation provide highly efficient discharge of carbon dioxide without waste directly onto the fire.

This extinguisher is so simple and easy to handle that a child or a woman in the household can operate it successfully. A two-colored, eight-page bulletin, No. AK-498, fully describes this new equipment and is offered free by the manufacturer.



SERIAL NUMBER

ISSUE NUMBER

UNITED STATES
DEPARTMENT OF COMMERCE
BUREAU OF NAVIGATION AND
STEAMBOAT INSPECTION

LICENSE TO CHIEF ENGINEER OF STEAM VESSELS

This is to certify that U.S. Engineer having been duly examined by the undersigned United States Local Inspectors Bureau of Navigation and Steamboat Inspection for the district of San Francisco, as to his knowledge of steam machinery and as to his experience, and found to be competent is hereby licensed to act as Chief Engineer on — condensing — Ocean — steam vessels of any gross tons, for the term of five years from this date.

Given under our hands this 2nd day of Jan. 1937.

Cancelled

Your Problems Answered

by "The Chief"

The word "Cancelled" was inscribed on face of the above license at the direction of the Bureau of Marine Inspection and Navigation. As used here it means "Specimen Copy."

BALL AND ROLLER BEARINGS

QUESTION

What is the meaning of the term "preloading" when used in connection with ball bearings?

ANSWER

The loading of a ball bearing is the pressure between the ball and race which tends to indent the races and flatten the ball. If a ball bearing is manufactured with some pressure on the balls before being installed or fitted to the shaft, it is said to be **preloaded.** If there is no pressure on the balls before putting bearings on the shaft, but no clearance, it is said to be a **close fit up bearing.** Note that, in putting the bearing on the shaft, the ball fit may be changed due to stretch of inner race. And if there is any clearance at all it is said to be a **loose fit up.** This is controlled by the bearing manufacturer and the bearings are sold as such, each having their particular application.

Another way to preload ball or taper roller bearings is in the use of a pair of bearings on a shaft which are designed to take full load in an axial direction. These are called angular contact or thrust bearings. By carefully adjusting the axial distance between the bearing races with shims it is possible to impose a load on them before they are under their normal running load.

Preloading tends to shorten the life but gives more accurate positioning of the shaft as needed, for instance, in some grinding processes. Obviously preloading is an adjustment or fitting process of great precision, involving dimensions or adjustments in the order of less than .0001 inch.

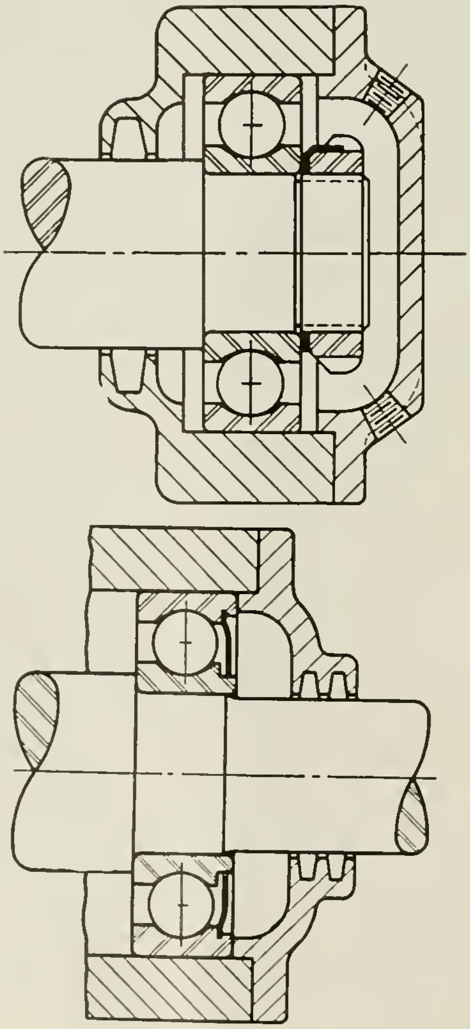


Fig. 1 (upper) and Fig. 2.

QUESTION

For what purpose are close fit up bearings used?

ANSWER

Special close fit up bearings are used for very high speeds, such as 10,000 r.p.m. or more, or sometimes for quiet operation at moderate speeds. The standard bearing is usually a close fit up and a special selection of standard bearings may be used for extra quiet or high speed purposes.

QUESTION

What is the use of the loose fit up bearings?

ANSWER

A bearing would not normally be used running in a loose fit up condition. However, where the inner race is to be held on the shaft only by shrink or press fit, the process of putting on the shaft will expand the inner race slightly and in this case a loose fit up bearing should be used. It will be a close fit up after installation, and if the press fit is too tight it may result in a preload on the bearing which would not be desirable. Many bearing failures can be attributed to a heavy preload due to carelessness in the fit of inner race to shaft. Preloads may easily exceed normal load by many times.

QUESTION

How can preloads from race to shaft fit be avoided?

ANSWER

Most auxiliaries with ball bearings will be found with a nut and lock washer used to clamp the inner race against the shoulder of the shaft. This is the usual case and requires a close fit up bearing but only a very light press fit or tap fit between race and shaft. The race is held in place and from turning by the pressure of the nut.

Figure 1 illustrates a close fit up bearing with nut and lock washer. Also shown are openings for grease admission and drain off.

Figure 2 illustrates the loose fit up bearing pressed or shrunk on the shaft. It also shows the grease seal built into the bearing. Note that the absence of a nut permits reducing the length of the housing.

QUESTION

How are bearings removed from the shaft?

ANSWER

If secured with a nut, the bearing after removal of nut should be only a light fit easily displaced by tapping or pull. Do not apply heavy forces to the outer race unless bearing is already damaged and is to be replaced. Apply forces to the inner race with soft metal tool. Apply uniformly all around to prevent binding.

If no nut is used the bearing is probably a tight press fit, with the inner race perhaps as much as .001 inch smaller than the shaft. Use only a puller equipped with a special fitting to apply force to the inner race, exclusively, as otherwise the bearing will be damaged. Tapping on the inner race while strain is on the puller may help to start it.

QUESTION

How should bearings be placed on the shaft?

ANSWER

Light fits may be tapped on, using a pipe or tool to deliver the force around the inner race. Caution must be used to prevent cocking the bearing, causing it to bind at an angle.

A tight fit should be put on only in a press or by heating. If pressed on be careful not to cock it even the slightest amount. Never apply force to the outer race.

If put on hot, bearing should be heated to about 175 degrees F. above the temperature of the shaft, or, say roughly, to a temperature just above the boiling point of water. A hot oil bath may be used or a dry oven.

In any case, greatest care should be used not to get dirt or foreign material in the bearing. The slightest metal particle adheres to the oil or grease and may never get out. Hot oil is a fire hazard.

When hot, the bearing should slide on easily, as this temperature will increase the diameter about .001 inch for each inch of diameter.

The accompanying tabulation shows the fits recommended for most press fits of all kinds. The last two columns cover ball bearings. It should be remembered that only loose fit up bearings should be pressed on the shaft either hot or with press. The dimensions given show the amount that the shaft should be larger than the bore of the race or hub.

QUESTION

What should be the fit between outer race and housing?

ANSWER

This should be a loose or sucking fit. It should slip in and out without force or tools, but should never be loose to the point of having a clearance. Many installations require the outer race to move axially a slight amount to prevent strains from expansion or a slight end play. The bore should be larger than the outside diameter of the outer race but the difference should never be more than about .001 inch per inch of diameter, and preferably .0003 inch per inch of diameter.

Our next article will start a series on boiler feed water treatment and its associated chemistry.

PRESS AND SHRINK FIT ALLOWANCES

All holes to size — allowance to be made on shaft

			PRESS FITS				
Dia. in Inches	Slide Fit	Split Hub Fit	Solid Steel	Solid Cast Iron	Coupling and Shrink	Ball Bearing Max.	Ball Bearing Min.
	Minus	Plus	Plus	Plus	Plus	Plus	Plus
½	0.0005	0.0005	0.0005	0.0005	0.001	0.0009	0.0001
1	0.0005	0.0005	0.0005	0.001	0.0015	0.0012	0.0002
1½	0.0005	0.0005	0.0005	0.001	0.002	0.0012	0.0002
2	0.0005	0.0005	0.0005	0.0015	0.0025	0.0012	0.0002
2½	0.0005	0.0005	0.0005	0.002	0.003	0.0014	0.0002
4	0.001	0.001	0.001	0.0025	0.004	0.0017	0.0003
8	0.001	0.001	0.0015	0.0035	0.006		
12	0.001	0.001	0.002	0.004	0.008		
16	0.001	0.001	0.002	0.005	0.009		
20	0.0015	0.0015	0.0025	0.0055	0.010		
30	0.0015	0.0015	0.003	0.007	0.0125		
40	0.002	0.002	0.004	0.008	0.0145		
48	0.002	0.002	0.0045	0.009	0.016		

It is impossible to estimate accurately the pressure required for any particular case. It has been found, however, that a rough approximation of the pressure required with cast iron on steel is five to six tons per inch of shaft diameter, when above allowances are used.

A rise in temperature of 175 deg. F. gives 0.001 inch per inch in steel expansion and preload of 16,600 lbs. per square inch. Roughly, this is just above the boiling or sizzling point, when taken above room temperature.

PROOF OF CITIZENSHIP

The following notice regarding license application and renewal was issued by the U. S. Department of Commerce, Bureau of Marine Inspection and Navigation. We published this under our Deck Officers' Department in the June issue of Pacific Marine Review, and now by request reprint it for the special benefit of the engineer officer:

All officers applying for a renewal of their marine licenses must submit to the Local Inspectors proof of their citizenship.

Applicants for the issuance of original licenses and renewal of licenses to deck and engineer officers, Continuous Discharge Books and Certificates of Identification issued by the Bureau of Marine Inspection and Navigation, claiming to be citizens of the United States, shall produce to the Local Board of Inspectors evidence of such citizenship before taking an examination.

Acceptable evidence is described below in the order of its desirability:

1. Birth certificate or a certified copy.
2. Baptismal certificate or parish record recorded within one year after birth.
3. Statement of a practicing physician certifying that he attended the birth and that he has a record in his possession showing date on which it occurred.
4. State Department passport.
5. Seaman's Protection Certificate.
6. Report of the Census Bureau showing the **earliest record** of age or birth available. Request for such information should be addressed to the Director of the Census, Washington, D. C. In making such request, definite information must be furnished the Census Bureau as to the place of residence when the first census was taken after the birth of the applicant, giving the name of the street and the number of the house, or the names of the cross streets between which the house was located if residing in a city; or the name of the town, township, precinct, magisterial district, militia district, beat or election district, if residing in the country; also the names of parents, or the names of other persons with whom residing on the dates specified.

Note: A census was taken in the following years: June 1, 1860; 1870, 1880, and 1900; April 15, 1910; January 1, 1920, and April 1, 1930 (records for 1890 are not available).

7. Naturalized citizens must present a Certificate of Naturalization or a certified copy of same.
8. If none of the above-mentioned forms of evidence is available, a statement to that effect should be made and correspondence in support of such a statement should be submitted.

The following may then be submitted for consideration:

School records, immigration records, insurance policies, affidavits of parents, or relatives, or an affidavit sworn to by two responsible citizens of the United States. (State circumstances of their knowledge of the applicant's citizenship.)

Engineers' Licenses

The following list shows licenses granted during the month of June to engineer officers of the merchant marine at Pacific Coast offices of the Bureau of Marine Inspection and Navigation:

Name and Grade	Class	Condition
SAN FRANCISCO		
Walter H. Zachow, Chief Eng.	OSS, any GT	RG
Francisco A. Jimenes, Chief Eng.	OSS, any GT	RG
Arthur J. Kelly, Chief Eng.	OSS, any GT	RG
Cyril G. Hansen, 1st Asst. Eng.	OSS, any GT	RG
Eugene C. Salvo, 1st Asst. Eng.	OSS, any GT	RG
John A. Katsos, 2nd Asst. Eng.	OSS, any GT	RG
Vincent J. McGarry, 2nd Asst. Eng.	OSS, any GT	RG
Ernest P. Pretor, 2nd Asst. Eng.	OSS, any GT	O
Henry A. L. Gompf, 2nd Asst. Eng.	OSS, any GT	O
Arthur R. Wood, 2nd Asst. Eng.	OSS, any GT	O
Stanley J. B. Turner, 3d Asst. Eng.	OSS, any GT	O
Volney Earl Julianel, 3d Asst. Eng.	OSS, any GT	O
Elmer Conwall Ehret, 3d Asst. Eng.	OSS, any GT	O
William Watson Fell, 3d Asst. Eng.	OSS, any GT	O
Jesse Lawrence Boyce, Jr., 3d Asst. Eng.	OSS, any GT	O
Lee Linn Buwalda, 3d Asst. Eng.	OSS, any GT	O
Adolph Johannes Erickson, 3d Asst. Eng.	OSS, any GT	O
Franklin Lee Martin, Jr., 3d Asst. Eng.	OSS, any GT	O
Davis Dunbar McElroy, 3d Asst. Eng.	OSS, any GT	O
George Andrew Nagle, 3d Asst. Eng.	OSS, any GT	O
Robert Edwin Simpson, 3d Asst. Eng.	OSS, any GT	O
George Stanley Twitchell, 3d Asst. Eng.	OSS, any GT	O
Harrell Marion Wilson, 3d Asst. Eng.	OSS, any GT	O
Kent Wadsworth Clark, Jr., 3d Asst. Eng.	OSS, any GT	O
Weston Francis Averill, 3d Asst. Eng.	OSS, any GT	O
Arthur Harry Blodgett, 3d Asst. Eng.	OSS, any GT	O
William Arthur Smith, 3d Asst. Eng.	OSS, any GT	O
Allen Ralph Sims, 3d Asst. Eng.	OSS, any GT	O
Francis Le Roy Wiley, 3d Asst. Eng.	OSS, any GT	O
Lloyd Tyler White, Jr., 3d Asst. Eng.	OSS, any GT	O
Harvey Albert Frey, 3d Asst. Eng.	OSS, any GT	O
Theodor Simon Fostiak, 3d Asst. Eng.	OSS, any GT	O
Donald B. Bivin, 3d Asst. Eng.	OSS, any GT	O
SEATTLE		
George Bisset, Chief Eng.	OMS, any GT	O
Thomas W. A. Wold, Chief Eng.	OMS, any GT	O
PORTLAND		
Ernest P. Butler, Chief Eng.	OSS, any GT	RG
SAN PEDRO		
Earl R. Uhlin, 1st Asst. Eng.	OSS, any GT	RG
Elwood R. Brubaker, 3d Asst. Eng.	OSS, any GT	O
John Spanburgh, 3d Asst. Eng.	OSS, any GT	O
Calixte M. Cook, 3d Asst. Eng.	OSS, any GT	O
James M. Hamby, 3d Asst. Eng.	OSS, any GT	O
Blake Payne, 1st Asst. Eng.	OSS, any GT	RG

Abbreviations: GT is gross tonnage; RG is raised grade; O is original license; OSS is ocean steamer; OMS is ocean motorship.

Steady as you go!

KNOWLEDGE IS THE STRAIGHT COURSE TO ADVANCEMENT

A Department for Deck Officers

RADIO NAVIGATION AT SEA AND IN THE AIR

Radio or wireless is undoubtedly the great gift of the 20th century to the art of navigation. Its use at sea, first as an emergency call for help and as a means of shore communication, has steadily advanced with the development of radio science until now it is the most efficient of navigation tools, as well as the chief source of entertainment at sea.

The amazing progress of this art in aerial navigation has been even more spectacular than in marine surface navigation, possibly for the reason that in the air it is often the sole guide for the aviator.

The dependableness of the modern radio directional apparatus is well attested by the experience of Pan American Airways in recent years. Since this experience is of great value to marine radio and its application to marine surface navigation, we are reprinting it from the Bulletin of the U. S. Hydrographic office, as follows:

It is no simple task to navigate a flying boat speeding at 3 miles a minute across 2,500 miles of trackless ocean. The navigation for a steamer crossing is simple by comparison. A steamship's officers can easily measure their speed and the direction of their course through the water. They have ample time to fix their position from sextant sights on sun or stars. When approaching a fog-bound coast they can cut speed or even heave to until the fog has lifted.

The officers on a flying Clipper ship work with no such advantages. Their speed through the air and the direction in which they point their plane, may be so affected by cross winds that it is far different from their actual path above the when fog or cloud lies between the ocean. In clear weather this can be checked by sighting on "drift bombs" by day or flares by night dropped onto the surface—but not plane and the sea. Then, sights on the sun in the daytime or on stars at night must be translated into latitude and longitude by the speediest computing methods—or the plane may be many miles from the determined position before it is plotted. A fog-bound coast must be approached and a landing place found—if not immediately at least within 5 or 6 hours of reaching it, and even then the plane must continue its swift forward motion.

Radio Is Key

And yet the chances of a Clipper losing its way in a transoceanic flight are infinitesimal. In almost 300 crossings of the Pacific, the Pan American crews have made some

Boeing 314, the 74-passenger, 41½-ton Pan American Clipper, in flight over Seattle and Puget Sound.

1800 land falls—mostly on tiny islands—without a single failure. Even under the worst of weather conditions the Clipper pilots have forecast, within margins of a very few minutes, the plane's arrival at bases hundreds of miles ahead.

Part of the answer to this remarkable record is radio. By means of special navigational instruments—a "drift sight" and a bubble octant—and with the regularity of clockwork, Clipper navigators take routine sights on the sea below for a check of the plane's actual course and speed, and by sights on sun and stars for what they call "celestial fixes." But the basic determinant of the Clipper's path in clear weather and foul is radio.

## ● Beams Too Limited

It is not, however, anything like the radio "beams" used on our domestic air lines, which send out paths of "on course" signals from transmitters located at key airports. Such beacons have ranges of less than 100 miles and are obviously impractical for ocean use.

More nearly comparable to Pan American's system are the direction finders located ashore for the use of inbound transoceanic steamers. Reduced to their simplest terms these are ordinary receivers connected to small antennas strung in flat loops and mounted so they can be swung around a vertical axis. When the plane of the loop is at right angles to an incoming radio wave it gives a maximum volume to the signal heard in the receiver. When it is swung to a position parallel to the incoming wave the signal decreases to a minimum. By so swinging their aerials, shore stations can thus "take bearings" on the signals broadcast from a ship's radio—then transmit that information to the ship. But such loops are subject to a number of errors, especially at night, at dawn, and dusk. And as developed through decades of marine use they were also limited in range to a very few miles.

● Devised for Caribbean

Pan American ran into the need for such a radio aid to navigation as soon as it started operating across the 600-mile wide Caribbean Sea between North and South America in 1929. The British air lines had used a variation of the marine system with some success in their services across the 50-mile wide English Channel. Pan American tried it out but found it, too, gave weird results at night—especially when affected by tropical static. Test after test was made, but no radio apparatus in existence could provide the range necessary for over-ocean flying.

Pan American's radio engineers plunged into researches to devise an error-proof system of their own that would have adequate range for any transoceanic work. They began by confounding previous radio theory which held that low frequencies—long waves—only could be adapted for direction finding. But Pan American engineers soon found that long waves could not give them the necessary range nor the necessary dependability. They initiated their

Deck Officers' Licenses for June

Name and Grade	Class	Condition
SAN FRANCISCO		
James A. Lovering, Master	OSS, any GT	RG
Hans A. Crauel, Master	OSS, any GT	RG
Robert L. Dahllof, Chief Mate	OSS, any GT	RG
Harry Ainsworth, Chief Mate	OSS, any GT	RG
George A. Sokoloff, 2nd Mate	OSS, any GT	O
Robert Bellmer, 3d Mate	OSS, any GT	O
Joseph B. Medeiros, 3d Mate	OSS, any GT	O
Charles Wood Audet, 3d Mate	OSS, any GT	O
Stanley Walter Grabowski, 3d Mate	OSS, any GT	O
James Moorhead Clawson, 3d Mate	OSS, any GT	O
Robert Nelson Hargis, 3d Mate	OSS, any GT	O
Duke McNabb, 3d Mate	OSS, any GT	O
Gordon Ritz Kilburn, 3d Mate	OSS, any GT	O
Norman Brinton Young, 3d Mate	OSS, any GT	O
Herman Louis Leichel, 3d Mate	OSS, any GT	O
Robert Melvin Maehle, 3d Mate	OSS, any GT	O
Harlan Claire Dupuis, 3d Mate	OSS, any GT	O
John Marcus Boyer, 3d Mate	OSS, any GT	O
Dan Albert Dancy, 3d Mate	OSS, any GT	O
Stanley Jack Drummond, 3d Mate	OSS, any GT	O
Charles Ardell Krauchi, 3d Mate	OSS, any GT	O
Ross Elliot O'Laughlin, Jr., 3d Mate	OSS, any GT	O
Noel Vernon Bird, 3d Mate	OSS, any GT	O
William John Williams, 3d Mate	OSS, any GT	O
Warren Dyer Sype, 3d Mate	OSS, any GT	O
James Morley Hendy, 3d Mate	OSS, any GT	O
Harold Philip Jensen, 3d Mate	OSS, any GT	O
Eugene Adolph Yates, 3d Mate	OSS, any GT	O
Douglas Rainey McMurtry, 3d Mate	OSS, any GT	O
Charles Koll Holzer, 3d Mate	OSS, any GT	O
SEATTLE		
Charles A. Howes, Master	OSS, any GT	RG
Joseph C. Barnes, Chief Mate	OSS, any GT	RG
Richard A. Johnson, Chief Mate	OSS, any GT	RG
Eugene W. Hundley, 2nd Mate	OSS, any GT	RG
George W. Roberts, 2nd Mate	OSS, any GT	RG
Clinton F. Heinrich, 3d Mate	OSS, any GT	O
Joseph P. Wrinn, 3d Mate	OSS, any GT	O
PORTLAND		
William G. Stayton, Chief Mate	OSS, any GT	RG
Stanley B. King, 2nd Mate	OSS, any GT	O
SAN PEDRO		
Curtis Q. Bruns, 3d Mate	OSS, any GT	O
Edward W. Hollis, Chief Mate	OSS, any GT	O
Robert J. McKenzie, 2nd Mate	OSS, any GT	RG

Abbreviations: GT is gross tonnage; RG is raised grade; O is original license; OSS is ocean steamer; OMS is ocean motorship.

own research into high frequency—short wave—possibilities.

Expanded for Pacific

By 1932 Pan American bases were giving accurate bearings to planes 600 miles across the Caribbean. In 1935, when the Pan American Clipper blazed the trail for the trans-Pacific airway, stations in California were giving it bearings at points 1,600 miles at sea on the way to Honolulu within an accuracy of less than 1 degree. Some months later the California station, as a stunt, achieved the same accuracy in a bearing taken on a Clipper just out of Manila, 8,500 miles away. Out of this research, and the years of practical experience, has come a remarkably effective long-range directional guide whose construction and installation is still a closely guarded secret. And Pan American is the only airline in the world with such an instrument.

Gone is the swinging aerial; instead, the antenna is fixed, and the moving element, whatever it is, is mounted on the table within the operator's station. Gone, too, is all tendency for readings to shift due to night effect, balanced out by a complex automatically operating electrical hook-up.

Completed in Seconds

The process of sending a signal from the ship and waiting for a bearing from the station is an incredibly swift process. Each Clipper has two long-range radio transmitters, two long-range receivers, and duplicate antennas. Actually when the Clipper is approaching a fog-bound coast its radio officer transmits a continuous signal from one antenna and receives a practically instantaneous bearing in response. So swift is the process, the big Clippers can be brought right down onto the harbor in "blind" landings with no other guidance. In effect this radio guide is a "line" attached to the aircraft, fore and aft, and linked directly to the guarding shore stations. It checks the captain as to his course every 30 minutes in fair weather and, under conditions which impair the crew's visibility, the bearings hum aboard at the rate of three every two minutes.

Duplicated on Planes

As a "double check" on their aerial navigator Pan American engineers have, within the past three years, perfected a miniature of these direction-finder stations which can be installed on each of the Clippers. Thus equipped, the Clippers "double check" their course by bearings taken on ships at sea or on shore stations, independent of and supplementary to the bearings received from its terminal direction finders. The range of these "flying direction finders" is now such that it converts into a guarding station any radio-equipped vessel within 900 miles of the Clipper. Peculiarly enough, on the long transpacific crossing to the Orient, steamers have asked the Clippers for bearings through which to check their own (the ship's) positions thousands of miles at sea.

It would seem that ships' officers should learn some of the aviator's radio technique. Certainly it would be of great advantage for a ship's navigation officer to be able in emergencies to spot his position from a radio-beacon as quickly as the aerial navigators do. Constant practice on the radio direction finder in fair weather gives not only proficiency but confidence in the accuracy of this instrument. Undoubtedly this is the secret of success in aerial navigation, for these first mates and masters of the air are kept constantly at the business of reporting positions to the home office and to the destination landing field.

By this sort of routing ships may be kept: in safe courses; in constant communication with their shore base and with all other ships in any given area; away from storm areas, and in good deep water.

The radio time signal and the radio directional beacon spot a vessel with great accuracy, and when checked by stellar and solar observation they leave so little room for error as to be practically infallible.

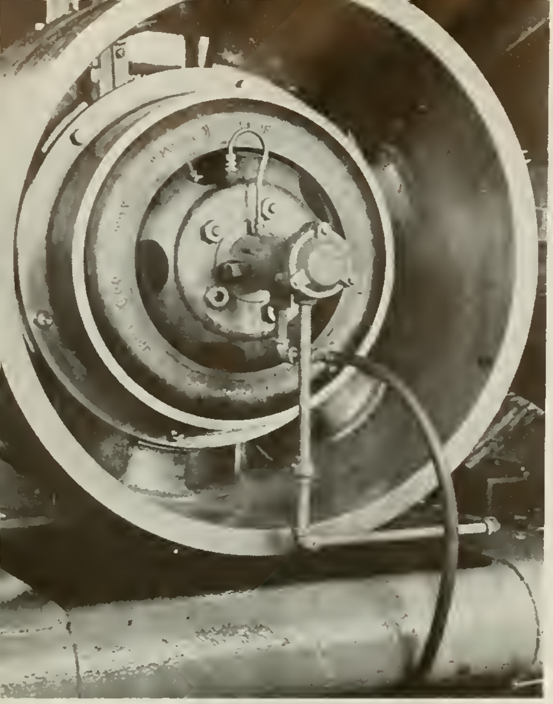
Every deck officer should secure first hand information on the methods and instruments used by the aviators in order to improve his own technique in navigating by radio.

Change of Masters

Steamer Mapele: F. E. Trask; vice, O. Bergman.
Steamer Manukai: Stephen G. King; vice, K. Hubbennette.
Steamer Montebello: O. O. Nielsen; vice, M. Andreassen.
Steamer Miraflores: H. J. Spillman; vice, George O. McGrath.
Steamer Lurline: K. Hubbennette; vice, A. C. Berndtson.
Steamer J. A. Moffett: C. Cagle; vice, H. O. Bleumchem.
Steamer Olopana: M. J. Bulger; vice, H. Speller.
Steamer Mericos H. Whittier: O. H. Pitts; vice G. B. Macdonald.
Steamer Illinoin: F. A. Bain; vice, H. Gries.
Steamer LaPurisima: L. L. Lishman; vice, O. Belin.
Steamer W. S. Rheem: J. S. Christenson; vice, Joseph Fox.
Steamer Honomu: W. E. Turnquist; vice, R. M. Pierce.
Steamer Virginian: R. M. Pierce; vice, R. A. Oliver.
Steamer K. R. Kingsbury: A. H. Koshkin; vice, C. Baker.
Steamer F. H. Hillman: John S. Engs; vice, O. H. Koshkin.
Steamer Columbian: O. Lee; vice, C. T. Gaidsick.
Steamer Liloa: Fred N. Troupe; vice, L. G. Vick.
Steamer Lahaian: Merwyn C. Stone; vice, Fred N. Troupe.
Steamer R. J. Hanna: L. E. Haskell; vice, R. M. Melbye.
Steamer J. J. Coney: Perry K. Countryman; vice, W. N. Prengel.
Steamer Coast Trader: L. G. Havens; vice, E. A. H. Watkins.
Steamer Kainalu: E. F. Lono; vice, H. W. Heuer.
Steamer Montebello: M. Andreassen; vice, O. O. Nielsen.
Steamer West Shipper: E. Mesak; vice, Karl H. Modin.
Steamer Mexican: C. H. Brunn; vice, B. Leep.
Steamer Kalani: F. M. Graham; vice, W. G. Leithead.
Steamer Coast Miller: E. A. H. Watkin; vice, L. A. Rasmussen.
Steamer Olympic: Frederick W. Oest; vice, T. Sorenson.

The Airflex Clutch

A New Development of Merit in the Marine Field



Airflex clutch in an oil rig drive.

The same engineering principle that today is preventing thousands of motorcars from skidding on wet and slippery pavements has made possible a new type of mechanical clutch that promises to make obsolete most clutches now used in industry.

When the multi-vaned tread of the General Dual-10 and Dual-8 motorcar tires was perfected by General Tire and Rubber Company engineers, it was proved that, under braking pressure, the many narrow vanes or ribs of rubber squirmed into a serpentine form and clung to the road surface with a degree or adhesion never before thought possible.

Adhesion being the principal job of a clutch, no matter where it may be used, it was only a step from the multi-vaned tire that clings to the pavement to the Airflex rubber clutch, whose multi-vaned surface clings to steel with twice the friction coefficient of asbestos or other conventional clutch lining.

In the many installations where the conventional clutch was replaced by the rubber clutch many months ago, tests invariably have proved that the rubber clutch lasts longer, as it adjusts itself to the conditions under which it must operate and suffers no wear from misalignment.

The Airflex rubber clutch has replaced multiple disk and other plate clutches in various installations with complete success. It has the advantage over the conventional clutch in being much lighter, thus saving weight. It is much simpler as well, having only three or four parts, as compared to 75 to 100 pieces in the conventional clutch. The Airflex clutch is self-adjusting while other clutches are not.

Rubber clutches have been successfully operated for months in marine engines and oil well rigs.

The 40-inch Airflex clutch is the largest made up to this time and is being used on marine engine applications, with 3000 H.P. capacity.

Because of the flexibility in the application of its pressure, the Airflex clutch provides uniform pressure on every inch of surface.

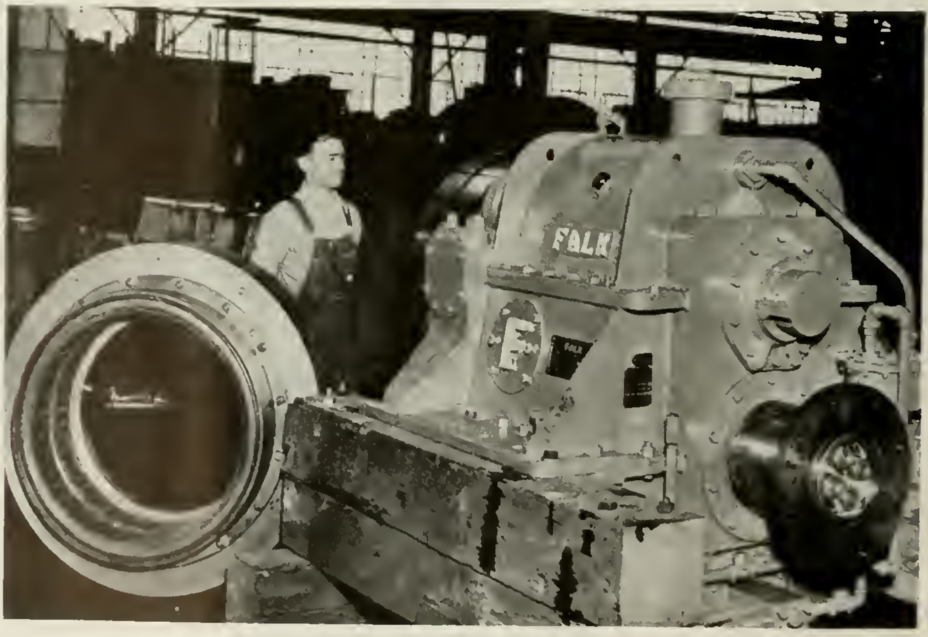
While the capacity of other types of clutches is fixed and is not changeable, the capacity of the Airflex clutch is regulated by internal pressure and can be changed to conform to needs and conditions.

Two distinct types of lining are used on both the expanding and constricting types of Airflex clutches. When excessive slippage is encountered and where loads are to be picked up gradually, the use of friction lining is recommended. When the plain rubber squeegee-tread is used, a reasonable amount of slippage can be tolerated if the engagements are not too frequent.

The clutches are given special treatment to prevent disintegration by oil fumes. A special rotary seal has been developed to deliver air to the clutch, either by entering the shaft at the end or by a straddle-type seal.

The Fawick General Company has been organized to manufacture the new Airflex clutch and will be affiliated with the General Tire and Rubber Company.

Licenses for the distribution of the Airflex marine type clutch have been granted to the Falk Corporation of Milwaukee, Wisconsin.



A Falk reduction gear and 30" Airflex clutch for transmitting 950 horsepower at 750 r.p.m. on a Mississippi River towboat.

An Oil Cushion for the WORLD'S MIGHTIEST MARINE REDUCTION GEARS!

THE DRIVING POWER of the new 36,000-ton *Mauretania's* great turbines is transferred to the twin propellers through two 85-ton reduction gears.

These gears—the largest marine-turbine reduction gears in the world—must mesh smoothly, run quietly and last through long years of service.

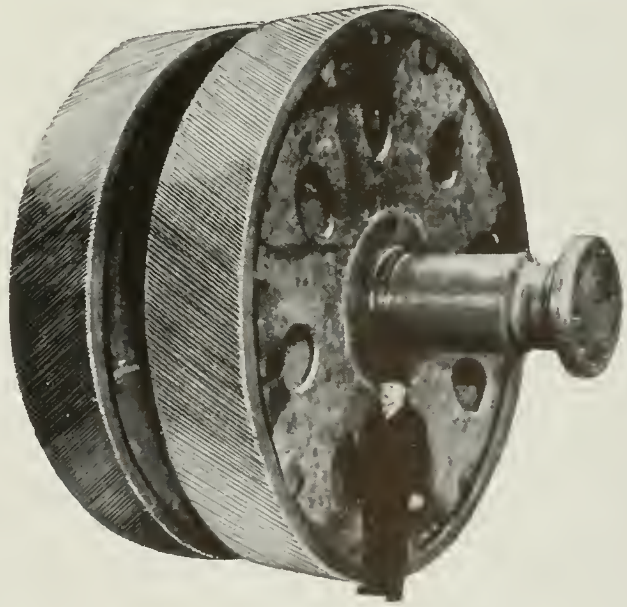
These giant gears—and the huge turbines that drive them—require lubricants that will give perfect performance under all conditions—and Cunard White Star called on Shell to furnish just such lubricants.

When this magnificent new ship sailed on her maiden voyage, Cunard White Star felt sure—because of Shell's wide experience in marine lubrication—that they had made a sound decision in choosing Shell Lubricants for this important job.

• • •

Whether it's a problem of lubricating a huge ocean liner or a fishing trawler—a great power plant or a single bearing—Shell is prepared with the right lubricant for every use.

With a record of performance that made it the logical choice to lubricate the world's largest marine-turbine reduction gears, Shell is fully equipped to handle your lubrication problems—whether large or small. ***Why not call in Shell's staff of highly trained lubrication experts—today?***



THE NEW *MAURETANIA* is a twin-screw liner driven by single reduction-geared turbines. The two main reduction gears—one of which is illustrated above—are the largest ever constructed for a liner and weigh 85 tons each. The two propellers are also remarkable for a ship of her size, the weight of each being 25 tons.

SHELL MARINE LUBRICANTS

On the Ways-

SHIPS IN THE MAKING

LATEST NEWS FROM AMERICAN SHIPYARDS

AMERICAN MERCHANT SHIPBUILDING

CONDENSED IN ONE TABLE

VESSELS UNDER CONSTRUCTION AND/OR UNDER CONTRACT IN U. S. YARDS

JULY 1ST, 1939

TO AMERICAN BUREAU OF SHIPPING CLASSIFICATION

Builder	*Hull No.*	*Type Size*	*Power*	*Owner*	*No. of Vessels*	*Gr. Tons (Est.)*
SEAGOING:						
Bethlehem Steel Co. Sparrows Point, Md.	4329-30-1	Oil Tanker 525'x75'x39'	Steam 12000 H. P	Standard Oil Co. of N. J.	(3)	11500 ea.
do	4333	Oil Tanker 487'6"x68'x37'	Steam 4000 H. P.	Socony-Vacuum Oil Co.	(1)	9800
do	4337-8-9	Pass. Cargo Vessel 465'x65'6"x39'9"	Steam	Mississippi Shipp. Co.	(3)	8300 ea.
do	4340	Oil Tanker 442'x64'x34'10"	Steam 3500 H. P.	Union Oil Co. of Cal.	(1)	8000
Bethlehem Steel Co. Quincy, Mass.	1469	Pass. Cargo Vessel 471'8"x64'x38'6"	Steam 8000 H. P	Panama RR SS Line	(1)	9000
do	1474 to 1477	Cargo Vessel 450'x66'x33'4½"	Steam 8000 H. P.	American Export Lines, Inc.	(4)	8500 ea.
Bethlehem Steel Co. Staten Island, N. Y.	8001-2-3	Tug 195'x38'6"x22'	Diesel Elec. 3000 H. P.	U. S. Navy	(3)	1150 ea.
Charleston S.B. & D.D. Co. Charleston, S. C.	5500	Cargo Vessel 284'x42'x19'	Diesel 900 H. P.	Erie & St. Lawrence Corp.	(1)	1700
Federal S.B. & D.D. Co. Kearny, N. J.	152-3	Oil Tanker 525'x75'x39'	Steam 12000 H. P.	Standard Oil Co. of N. J.	(2)	11500 ea.
do	155 to 159	Cargo Vessel 435'x63'x31'6"	Steam 6000 H. P.	U. S. Maritime Comm.	(5)	7400 ea.
do	162 to 167	Cargo Vessel 465'x69'6"x33'6"	Steam 8500 H. P.	U. S. Maritime Comm.	(6)	8900 ea.
Ingalls Iron Works Co. Birmingham, Ala.	253 to 256	Cargo Vessel 465'x69'6"x33'6"	Steam 8500 H. P.	U. S. Maritime Comm.	(4)	8900 ea.
Lake Washington Shpyd. Houghton, Wash.	505	Survey Vessel 198'8"x38'x23'	Steam 2000 H. P.	Dept. of Commerce U. S. Government	(1)	1300
Moore Dry Dock Co. Oakland, Cal.	195-6	Cargo Vessel 465'x69'6"x33'6"	Steam 8500 H. P.	U. S. Maritime Comm.	(2)	8900 ea.
Newport News S.B. & D.D. Co., Newport News, Va.	369	Pass. Vessel 661'5"x93'3"x45'4½"	Steam 34000 H. P.	U. S. Lines Co.	(1)	24800
do	370-1-2	Oil Tanker 525'x75'x39'	Steam 12000 H. P.	Standard Oil Co. of N. J.	(3)	11500 ea.
do	373 to 376	Cargo Vessel 435'x63'x31'6"	Steam 6000 H. P.	U. S. Maritime Comm.	(4)	7400 ea.
do	379 to 384	Pass. Cargo Vessel 465'x69'6"x33'6"	Steam	U. S. Maritime Comm.	(6)	9200 ea.
Sun S.B. & D.D. Co. Chester, Pa.	176 to 180	Cargo Vessel 435'x63'x31'6"	Diesel 6000 H. P.	U. S. Maritime Comm.	(5)	7400 ea.
do	181	Oil Tanker 521'x70'x40'	Steam Elec. 6000 H. P.	Atlantic Refining Co.	(1)	11400
do	182 to 185	Cargo Vessel 465'x69'6"x33'6"	Diesel 8500 H. P.	U. S. Maritime Comm.	(4)	8900 ea.
do	186 to 189	Pass. Cargo Vessel 465'x69'6"x33'6"	Diesel	U. S. Maritime Comm.	(4)	9200 ea.
do	190	Oil Tanker 485'x68'x36'	Steam 9000 H. P.	The Texas Co.	(1)	9600
do	191-2	Seatrain 460'x63'6"x38'3"	Steam	Seatrain Lines, Inc.	(2)	8000 ea.
Tampa S.B. & E. Co. Tampa, Florida	33-4-5-6	Cargo Vessel 435'x63'x31'6"	Diesel 6000 H. P.	U. S. Maritime Comm.	(4)	7400 ea.
				TOTAL	72	613,550

Many Yards Tender Bids On C-1 Ships

At 12 noon of July 11 the U. S. Maritime Commission opened bids on its C-1 standard design and specification cargo vessels submitted by fourteen shipyards.

The C-1 design calls for a vessel about 413 feet long powered to maintain a sea speed of 14 knots at loaded draft. Bids were asked on 2 types of this ship and on both steam and diesel propulsion for each type, thus making four bid forms, as follows:

Form 1—Shelter Deck Type steam turbine propulsion.

Form 2—Shelter Deck Type diesel propulsion.

Form 3—Full Scantling Type steam turbine propulsion.

Form 4—Full Scantling Type diesel propulsion.

All bids were made with two prices: (A) a fixed price bid; (B) an adjusted price bid.

On the showing of the bare figures Consolidated Steel Corporation of Los Angeles appears to be the lowest bidder with responsible guarantee.

On a basis of building four ships, their bid for each ship was: Form 1, (A) $2,019,000, (B) $1,869,000; Form 2, (A) $2,098,000, (B) $1,948,000; Form 3, (A) $2,040,000, (B) $1,890,000, and Form 4, (A) $2,117,000, (B) $1,967,000.

The bid of Tampa Shipbuilding and Engineering Co. was very close to these figures and slightly lower on the

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capacity
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Tel.: ALameda 0533

GENERAL ENGINEERING
and DRY DOCK COMPANY

djusted price basis, but Tampa is filled up with the C-2 contract and would have to get additional capital to expand for taking on more work. The Newburg Shipbuilding and Repair Co. of New York put in a bid approximately 20 per cent lower than Consolidated Steel but with no guaranty bond.

Federal Shipbuilding and Dry Dock Co. was next above Consolidated. Their bids per ship based on construction of four ships were: Form 1, (A) $2,078,000, (B) $1,933,000; Form 2, (A) $2,240,000, (B) $2,084,000; Form 3, (A) $2,126,000, (B) $1,968,000; Form 4, (A) $2,267,000, (B) $2,109,000.

Sun Shipbuilding and Dry Dock Company bid per ship for four ships was: Form 1, $2,170,000; Form 2, $2,262,000; Form 4, $2,314,000; all fixed price basis.

Pusey & Jones bid, on a basis of 2 ships only, was for each ship and on a fixed price basis: Form 1, $2,220,97; Form 2, $2,350,310; Form 3, $2,262,851; Form 4, $2,390,438.

Seattle-Tacoma Shipbuilding Corp. (Todd) bid only on a basis of 5 ships, as follows: Form 1, (A) $2,362,200, (B) $2,201,300; Form 2, (A) $2,389,800, (B) $2,229,300; Form 3, (A) $2,383,300, (B) $2,220,900; Form 4, (A) $2,410,200, (B) $2,248,400.

General Engineering & Dry Dock Co., Oakland, California, were slightly higher on the fixed price basis than Seattle-Tacoma and somewhat lower on the adjusted price basis.

Los Angeles Shipbuilding and Dry Dock Corp. bids were approximately 3 per cent higher than Seattle-Tacoma.

The bids for Sparrows Point Plant of Bethlehem are almost exactly 6 per cent above those for the Bethlehem Union Plant at San Francisco. The latter are approximately 9 per cent above those of the Los Angeles Shipbuilding and Dry Dock Corp.

Western Pipe & Steel Co. bid only on Forms 1 and 3. Their figures for each of four were: Form 1, (A) $2,717,000, (B) $2,470,000; Form 3, (A) $2,750,000, (B) $2,500,000.

At the present writing no authoritative word has come from the U. S. Maritime Commission on any award under these bids. It is reported that the Commission thinks all bids too high and that negotiations are under way with several of the bidders. Reliable sources of information indicate that several Pacific Coast firms have good chances to get some of the work.

• Cargo Ships for Robin Line

Bids are being opened August 1 by the U. S. Maritime Commission for 3 cargo vessels designed by George C. Sharp, naval architect, of New York, for the Seas Shipping Company, Inc., operators of the Robin Line between U. S. North Atlantic ports and ports of East and South Africa.

These vessels will be 485 feet long overall, with 66 feet beam, 43 feet depth, and a loaded draft of 27 feet (max.). They will measure 15,200 tons displacement, carry 9,900 deadweight tons, have a bale capacity of 600,000 cubic feet and a refrigerated cargo capacity of 40,000 cubic feet. Steam turbine of 6,000 shaft horsepower will give them a sustained sea speed of 15½ knots.

• Navy Machinery Contracts

The Navy Department has awarded contracts for furnishing propulsion machinery for submarines as follows:

To Fairbanks, Morse & Co., 3 sets, 2 for Portsmouth, N. H., Navy Yard and 1 for Mare Island Navy Yard, using Elliot electric machinery, Farrel-Birmingham gears, Westinghouse or Cutler-Hammer control. Total, 2,824,575.

To General Motors Corp., 3 sets, all for New London, using General Electric electrical machinery, gears and controls. Cost, $2,606,001.

To American Locomotive Company, 1 set for Submarine 205, using General Electric electrical machinery and Farrel-Birmingham gears. Cost, $419,750.

Cramp Yard to be Revived

The famous Cramp yard at Philadelphia is said to be slated for opening on January 1, 1940. The directors of the Wm. Cramp and Sons Ship and Engine Building Co. plan to raise $4,000,000 and rehabilitate the plant to employ 5,000 men. The City of Philadelphia has a tax lien for approximately $1,000,000 in delinquent taxes, on which an adjustment agreement has been reached. Another $1,000,000 lien is held by the Federal Government for funds advanced for improvements.

Motorship Repaired at East San Pedro

The Los Angeles Harbor plant of the Shipbuilding Division of the Bethlehem Steel Company recently finished a nice repair job mainly on the diesel engine of the Norwegian motorship Martin Bakke. Most of the damage was done by a broken piston rod of the 5,900 horsepower motor. The damage was $80,000.

Sun Gets Contract for Two Seatrains

The Seatrain Lines, Inc., of New York, late in June awarded the Sun Shipbuilding & Dry Dock Company a contract to build two of their seatrain vessels duplicating the Seatrain New York and the Seatrain Havana, which were built by Sun in 1932.

These vessels will have the following principal characteristics:

Length B.P.	468′ 6″
Length O.A.	478′ 0″
Beam molded	63′ 6″
Depth molded	38′ 3″
Deadweight at 23′ 3″ draft	8,790 tons
Deadweight at 26′3″ draft	10,945 tons
Number cars carried	100

Details of propulsion machinery have not yet been decided for the new vessels. The Seatrains New York and Havana have cross compound geared turbines taking steam at 375 lbs. pressure from water tube boilers and developing 8,800 shaft horsepower, which maintains a sea speed of 15½ knots.

The seatrains carry loaded freight cars which are hoisted on or off at specially designed terminals. No longshoremen required.

Lykes Brothers to Operate C-1's

An agreement has been concluded between the U. S. Maritime Commission and the Lykes Brothers Steamship Company of New Orleans, whereby the former will construct 18 cargo vessels for the latter. Ten of these vessels will be laid down in 1939, four in 1940, and four in 1941. Contracts for the first 10 are to be executed before September 1, 1939.

The contract contemplates the Commission's C-1 type and its terms call for 9 vessels to be purchased by Lykes Brothers under the Construction Differential Subsidy provisions of the Merchant Marine Act, and for 9 to be built for its own account by the Maritime Commission and chartered to Lykes Brothers for five years.

Federal Launches Lightning

On July 15 at 8:35 a.m. the Federal Shipbuilding and Dry Dock Company launched its third C-2 standard cargo vessel, Hull No. 156. Mrs. Royal S. Copeland, widow of the late Senator Copeland, sponsored the craft, naming her "Lightning," after Donald McKay's great clipper.

On her maiden voyage from New York to Liverpool, to be delivered to her British owners for the Australian trade, the clipper ship Lightning broke all records for fast sailing. In one 24-hour stretch she logged 436 miles, which requires an average speed of better than 18 knots and is the fastest (verified) speed ever made under sail.

The new S.S. Lightning has 6,600 horsepower available but we doubt whether she ever tops this record.

Bethlehem Launches Fast Tanker

On July 8 at Sparrows Point, Maryland, the Shipbuilding Division of the Bethlehem Steel Company, Inc., launched Hull No. 4329, first of three large, fast national-defense-feature tankers building for the account of the Standard Oil Company of New Jersey.

This vessel was christened S. S. Platte.

Sun Launches Tanker E. J. Henry

The third of The Atlantic Refining Company's new 18,100-ton welded tankers was launched at the yards of the Sun Shipbuilding and Dry Dock Company, Chester, Pa., July 29. She was christened by Mrs. E. J. Henry, wife of a vice president of The Atlantic Refining Company, for whom the vessel will be named.

Like her sister ships, the J. W. Van Dyke and the Robert H. Colley, both of which were commissioned in 1938, the E. J. Henry has an overall length of 541 feet 5 inches and a beam of 70 feet. Cargo capacity is 156,000 barrels, or 6,552,000 gallons, enough to supply the gasoline requirements of 10,000 motorists for a full year. Turbo-electric engines are designed to develop 5,000 horsepower and will give the vessel a speed of 13.25 knots.

The E. J. Henry is scheduled to go into service in September on the run between Philadelphia and Texas Gulf ports.

Naval Building Program

The U. S. Navy has listed as now under construction, under contract or under allocation at Navy yards and private yards 101 war and auxiliary craft at a cost aggregating over a billion dollars. These ships range from nine small "mosquito fleet" motor torpedo boats to eight 35,000-ton and two 45,000-ton battleships.

Trade-In Ships Bought by Navy

The Grace Line is turning in to the Maritime Commission its two motorships Santa Rita and Santa Inez as part of the payment to the Commission for three new C-2 standard cargo vessels now building in Atlantic Coast yards. The Navy will buy these two motorships and use one as tender ship for Pacific Alaska air bases and one as a survey ship.

Santa Rita and Santa Inez are 15-knot vessels of 4576 gross tons built by Burmeister & Wain of Copenhagen in 1929 and powered with B. & W. engines of 3500 S.H.P.

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Twenty New Picket-Boats For Coast Guard Fleet

United States Coast Guardsmen saved 8,643 lives and gave assistance to vessels valued, with cargoes, at $59,755,039 during the fiscal year ending June 30, 1938. The number of lives saved was the largest in the 148 years' history of the Coast Guard. An important aid in achieving this magnificent record is the Coast Guard fleet of Picket-Boats, sturdy motor-launches built to perform a wide range of duties including protection of life and property, towing and general dispatch and patrol work.

These little boats are known as the friend of the yachtsman and fisherman. If you are unfortunate enough to run your motorboat or yacht aground or to get into other difficulties in your coastal cruising, chances are it will be a Coast Guard Picket-Boat that comes to your assistance.

These boats must be built to withstand the smashing fury of raging offshore seas. Distress at sea usually comes under storm conditions, and the Picket-Boat must be designed and constructed to "take it." Strength and endurance are basic essentials of every Coast Guard boat and crew.

The 20 new U. S. Coast Guard Cabin Picket-Boats, designed by Eldridge - McInnis, Boston, Mass., and under construction in the New Bedford, Mass., yard of Palmer Scott & Company, embody every feature of strength and endurance that knowledge and skill can impart. Each boat is 38 feet long, 10 foot beam, and draws 3 feet. Displacement is about 16,000 lbs. with tanks full and equipment aboard. All of these boats are equipped with radio and are armed with machine guns. Each boat, powered by a Special Sterling Dolphin, rated to develop 300 h.p. at 2,000 r.p.m., attains a top speed of 26 statute miles per hour.

Few laymen realize the huge increase of strain exerted on a boat by a relatively small increase in speed against wind and current. Twenty-six miles an hour in rough water sets up a severe strain on the hull of a boat. At this speed the oncoming wave hits a Picket-Boat with tremendous force. Hogback construction is necessary. Planking, fore and aft stringers, flooring, frames, engine bed, all must be heavy.

But to build a sturdy wooden hull is not enough. Each of the hundreds of wooden parts is joined to the others with strong, rust-proof metal. Planking screws, deck screws and keel-bolts are Revere "Herculoy" Silicon Bronze—a metal that combines the strength of steel with the corrosion-resisting quality of copper.

The gasoline tanks, too, are Herculoy. The exhaust pipe is 4½-inch copper tube. There is a large copper plate on the bottom for grounding the radio. There is a bronze plate above the propeller. The water pipe is brass. The rudder, quadrant, rudder shoe, stern bearing, inside stuffing boxes, are all of manganese bronze. The binnacle is of bronze. All equipment, such as searchlight, horn, running lights, smoke pipe, duplex strainers, gasoline strainers, and toilet fittings are either of brass or bronze.

Most of the copper and copper-base alloys used in the construction of these new Coast Guard Picket-Boats, as well as the boats themselves, were fabricated by the craftsmen of New Bedford, or in nearby towns. Much of the metal was supplied by the New Bedford mills of Revere Copper and Brass Incorporated. The copper rivets and nails were made by the Atlas Tack Company, Fairhaven, Mass.

The first of the fleet of 20 new boats was launched by the Palmer Scott Company, February 25, 1939, and production plans of the company according to Mr. Scott, as of that date, call for launching a completed boat every fortnight until the last of the 20 is in the water and accepted by the Government.

With addition of these 20 new boats the U. S. Coast Guard will have approximately 100 Picket-Boats in service on the Atlantic and Pacific Coasts, the Gulf, and the Great Lakes.

The marine insurance underwriters of America have no more loyal allies or better friends than the officers and men of the U. S. Coast Guard, especially since that body, as of July 1, 1939, has added the U. S. Lighthouse Service to its list of responsibilities. It is now the world's greatest organization devoted to marine safety.

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Bridge of R.M.S. Aquitania. Left to right: O. B. Whitaker, manager, Sperry Marine Dept.; H. N. Gale, staff captain, Aquitania; and J. A. Fitz, manager of publicity, Sperry Gyroscope Company. These men participated in the original installation of the Sperry Gyro Compass on the Aquitania 20 years ago.

Anniversary For Aquitania-Sperry

Coincident with the arrival of Cunard White Star's new Mauretania, the latest vessel to be fitted with a Gyro-Compass, the Cunard liner Aquitania arrived in New York on June 27, completing twenty years of Sperry operation.

Early in July, 1919, Aquitania, the late Captain Sir James T. W. Charles commanding, completed a westward crossing from Southampton, the first merchant vessel to arrive in New York equipped with a Sperry Gyro-Compass. This first experimental merchant type equipment made several successful voyages and was then replaced by the permanent installation, which has since continued in operation.

Since her July arrival twenty years ago, Aquitania has made a total of 576 crossings of the Atlantic and many special cruises, aggregating 2,000,000 miles. Captain Herbert N. Gale, present staff captain, was serving on the Aquitania at the time of that first Gyro-Compass installation.

In the comparatively short span of years since this epoch-making compass installation, Sperry Gyro-Compasses, in addition to becoming standard equipment on all Cunard White Star vessels, are in use in many hundreds of merchant vessels throughout the world of every type and under the flags of 121 fleets. The installations of later years have very generally included that most important auxiliary of the Gyro-Compass—the Gyro-Pilot, commonly called "Metal Mike," whose reputation as an able helmsman is well known to the seagoing fraternity.

NEW METALLIC COMPOUND FOR HARD SERVICE VALVES

Pump valves and other valves subject to unusual abrasive or corrosive action are now being successfully made of Kennametal, the new intermetallic compound of tungsten-titanium carbide, manufactured by McKenna Metals Co. Recent tests indicate that valves made of Kennametal will far outlast valves made of other materials.

Several high pressure needle valves, equipped with Kennametal needle tip and seat, were used in experiments involving a tarry fluid containing grit. Previously it had been necessary to change as many as seven valves in 24 hours; however, the Kennametal-tipped valves and seats gave such good service that it was necessary to replace only one valve every one to two weeks.

The superior strength of Kennametal balls and seats for oil well pump valves is demonstrated by tests recently conducted by a large oil well equipment manufacturer. In these tests Kennametal balls were hammered against seats of Kennametal by a pneumatic hammer, using 300 blows per minute of ram, 25 lbs. per sq. in. air pressure and 3/32 in. play between ram and ball and seat. After 105 minutes of hammering, the valves were still serviceable, as compared to a life of 9 to 11 minutes for tungsten carbide balls and seats. The Kennametal valves also showed superior resistance to corrosion in the waters of Louisiana oil wells.

Radio Telegraph Contracts

The contract for operation and maintenance of the radiotelegraph service on board the six new C-2 type cargo vessels being constructed for the United States Maritime Commission has been awarded to Mackay Radio and Telegraph Company by the Moore-McCormack Lines, Inc., who will operate these vessels in the American Scantic Line. The complete radio equipment on these vessels, including the additional first twenty-five C-2 and C-3 type ships to be constructed by the Maritime Commission, is being supplied by Federal Telegraph Company of Newark, New Jersey, manufacturing associate of Mackay Radio. The M.S. Donald McKay, first of the C-2 type vessels, entered service July 1, sailing from New York for Scandinavian ports.

The radio installation on the Donald McKay and the five other Mooremack vessels includes Mackay Radio Type 150-A main transmitter, Type 151-A high frequency transmitter and the Type 149-A emergency transmitter. The receiving equipment consists of a Mackay Radio Type 117-B all wave receiver and Type 123-B crystal receiver. This equipment enables the vessel to keep in constant touch with shore at all times, utilizing the intermediate, low and high frequency marine communication channels.

The radio direction finder is the new Kolster Type 106-A, employing the full vision indicator, which has become a familiar sight on the bridge of many vessels.

The auto alarm is a Mackay Radio Type 101-B equipped with an automatic keying device for transmission of international distress signals. This unit is unique in that it will receive the international distress signal from other vessels and automatically notify the bridge and the radio operator.

These vessels will operate with Mackay Radio's powerful marine coastal stations at Rockland, Maine; Amagansett, Long Island; West Palm Beach, Florida; and the New York Harbor Station, located in the International Telephone and Telegraph Building.

News of "The Bilge Club"

By William A. Mason
Lieut. Commander, U. S. Navy
(Retired)

At the tenth annual tournament, field day and barbecue of the Bilge Club, held last month at the Palos Verdes Country Club, San Pedro, George Bankson held the Bethlehem golf trophy, which he won with a low net of 63, and Don Montague gained low gross honors with a 78. W. H. Wickersham, founder of the Bilge Club, put up a stiff battle against Bankson, and Jack Malseed was right behind Montague for the honor list.

An all-time record for attendance was set by this year's outing, 397 being present.

"Nip" McHose was master of ceremonies, and Sheriff Eugene Biscailuz and Collector of Customs William Jennings Bryan, Jr., were among the guests. C. Otto Miller, Deputy Collector of Customs, took low gross honors in the Class B division, with R. MacAdams as runner-up. G. L. Ryan had the low net, being followed by H. Cluff, Ray Mitchell and Art Pegg, Jr.

Winners in the Class A tournament for guests were R. Deben, low gross; W. Hards, second; and S. McNamara, low net; S. Kunkel, second. In Class B for guests Mark Sampson had low gross; A. M. Rosenfeld, low net.

Class A tennis singles were won by McHose; Class B by B. Coughlin; Fred Pique and H. L. Bowen took honors for Class A doubles; and "Doc" McCracken and George Bronaugh walked away with Class B doubles.

W. S. Rash won the horseshoe pitching contest, T. W. McDonald coming in second.

With Al Barrow as captain, the "Sea Gulls'" softball team beat the "Palicans," captained by "Kelly" Kellenberger.

A "Guide to Historically Famous Lighthouses" is Available for your Locality and may be Obtained by inquiry of the Lighthouse Keeper or by Communicating with the Commandant, U. S. Coast Guard, Washington, D. C.

PROPELLER CLUB OF THE UNITED STATES, PORT OF TACOMA

The last dinner and meeting of the season of the Propeller Club of the Port of Tacoma was held Friday evening, July 7, at the Tacoma Country and Golf Course.

The high light of the evening was the appearance of the National Honorary President, Arthur M. Tode, who, as guest of honor, gave a very interesting and instructive address. Mr. Tode covered in detail the history of the Propeller Club organization from its inception in 1927 to the present day, which was climaxed last month in San Francisco by the formation of the Propeller Club of San Francisco, an objective long cherished by the National Organization.

Previous to the main address, a short business session was held and a short talk was given by Phil Gruger in connection with his work with the Tacoma Sea Scouts. It was voted by the members present to help the Scouts financially who are connected with the ship sponsored by the Club, and a future meeting of the Board of Governors will be held to determine what aid can be given.

After Mr. Tode's talk, the meeting was adjourned until next fall.

The New

Globe Wireless Marine Receivers

A Timely Discussion of the Shipboard Radio Receiver Problem

This month Globe Wireless Ltd. has announced development of two new marine radio receivers, the Type 936, intermediate frequency, and the Type 940, high frequency, both manufactured by Heintz and Kaufman Ltd., at their South San Francisco plant. The Type 936 is companion to the Globe 200 watt transmitter decribed in the May, 1939, issue of Pacific Marine Review.

In the recent past, many shipowners have gone to relatively great expense in providing new 200 watt radio transmitters for their vessels. Others are faced with the possible necessity of doing so before the close of the year. At the same time the receiver problem is often overlooked, yet the full value of an expensive transmitter is not realized unless the associated receiver, at a much lesser cost, will match its performance.

Aboard a surprising number of American craft the receivers are over fifteen years old. Yet technical advances in their design have been outstanding, as a comparison of new and old broadcast models will show. Marine receiver design has failed to keep pace with broadcast development. It is a fact that many models now offered for sale are actually old-fashioned. Since the superheterodyne circuit is employed almost exclusively in present broadcast receivers it follows logically that this would also be a most effective circuit for marine service.

The essential difference between marine and broadcast sets is in their mechanical make-up; the marine receiver must be rugged enough to withstand extremes of temperature, exposure and shock, continuous use over a period of weeks and constant manipulation of all controls. The mechanism of a good marine receiver is delicate and precise; for hard usage it should have a rigid panel, foundation and chassis, protected by an unusually heavy, shock-mounted container. All controls should be designed to withstand abuse.

Intermediate frequency marine receiver, Type 936.

Below are listed a number of advantageous features to be sought in any marine receiver:

• Sensitivity

A sensitive receiver will detect weak signals. However, a receiver that is merely sensitive is not adequate, because atmospheric noises are also picked up. Unless special provision is made, the limit of distance that can be covered is soon reached and the signal is drowned in a roar of static.

• Signal-to-Noise Ratio

By employing the superheterodyne circuit, the receiver tunes to so narrow a frequency range that atmospheric disturbances outside of the band actually occupied by the useful signal are not effectively heard. The result is a suppression of atmospheric and other background noises without appreciable loss of signal strength, or a higher signal-to-noise ratio.

Signal-to-noise ratio can also be improved by a refinement of the superheterodyne circuit known as the double superheterodyne or triple detection feature. Use of an audio frequency filter will also, but in a different fashion, improve this ratio and the results obtained by triple detection and the use of an audio frequency filter are additive.

• Selectivity

An adequately selective receiver often represents the difference between communication and no communication. There are so many radio signals constantly crowding each other that the receiver should respond to only a very narrow sector of the frequency spectrum. This would enable the radio operator to select the desired signal without excessive interference.

In high frequency operation, receivers tune so sharply that some signals can be brought in and tuned out without a perceptible motion of the dial. For the purpose of fine tuning, an additional control known as a "band spread" should be provided. Accurate resetting to a given frequency is important. The main and "band spread" dials are interdependent. In order that the signal may always appear at the same place on the "band spread" dial, the main dial of the receiver should be constructed to lock at a preselected point, near the middle of each high frequency marine band. This setting then being constant, the desired signal would always be heard at the same point on the "band spread" dial.

On high frequency receivers, coils must be changed to operate within different ranges of frequencies. This can be accomplished either by use of plug-in coils or a band change switch, as used in broadcast receivers. The latter method is preferable as it is economical of time and protects the coils from injury and wear by keeping them permanently within the receiver case.

- **Simplicity**

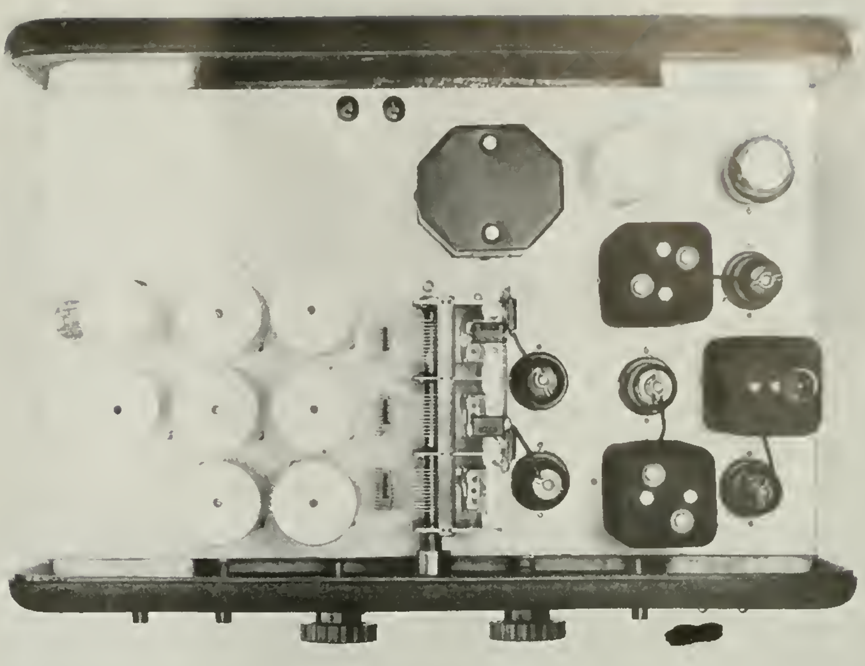
Excellent reception can be obtained by use of complicated circuits but they require more parts, any one of which may get out of order. The marine receiver is subject to such hard usage that a mean must be drawn between effectiveness and simplicity. The ideal marine receiver should employ a modern circuit, such as the superheterodyne, without unnecessary frills.

- **Control**

The number of controls should be kept to a minmum and constructed for hard usage. On the older types of receivers, the manipulation of one control often affects two others, resulting in a number of dial settings that respond to a given frequency. This makes accurate resetting difficult, resulting in the operator failing to hear all calls directed to his ship.

- **Economy**

Shipboard receivers require emergency power, as in the case of transmitters. In the past this has been accomplished by using battery power exclusively. Because storage batteries are normally used for the operation of tube filaments, and are semi-permanent, little economy can be effected by the use of ship's power for filament supply. But the plate or "B" batteries are expensive and are practically never of the storage type. They must, therefore, be discarded when consumed. If "B" batteries are connected for emergency use only, with ship's power for routine service, most of this expense can be eliminated.



Looking down on top of the intermediate frequency receiver with cover removed.

- **Audio Frequency Control**

Regardless of the selectivity of the receiver, it is sometimes impossible to separate an unwanted from a desired signal, as both may be on exactly the same frequency. However, the tone of one signal may differ from that of the other. A receiver with an audio frequency filter will reduce the intensity of either the low-pitched or the high-pitched signal, leaving the other one intelligible. The filter also improves the signal-to-noise ratio.

According to I. L. Irwin, Marine Representative of Globe Wireless, Ltd., the Globe receivers are designed especially for marine service, with these outstanding features:

1. Heavy and accurate mechanical construction to withstand shock, vibration, the inroads of saline dampness and continuous usage.
2. Sensitivity and selectivity obtained by use of the superheterodyne circuit for intermediate frequencies, and double superheterodyne circuit for high frequency operation.
3. An audio frequency filter to select between high and low pitched signals.
4. High signal-to-noise ratio obtained through the above superheterodyne and audio frequency control, features.
5. Simplicity of control.
6. A crystal detector in the intermediate frequency receiver for emergency use. This satisfies legal requirements for its operation as a combined main and emergency receiver on cargo vessels.
7. A "band spread" dial, operating in conjunction with a locking main dial in the high frequency receiver.
8. Economical first cost.
9. Economy of operation attained by employing ship's power in place of "B" batteries.
10. Use of separate intermediate and high frequency receivers makes it possible to maintain a standby watch on the distress and calling wave concurrently with operation on high frequencies. This cannot be done with a single combination intermediate and high frequency model.
11. Compliance with all F. C. C. and international radio regulations.

The Propeller Club of the United States

The Port of San Francisco

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Frazer A. Bailey
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Arthur Tode watches proudfully as Henry Gelhaus presents charter to Tirey L. Ford (center).

Tirey L. Ford, president of the Propeller Club, Port of San Francisco, greeted charter members of the new Port at a luncheon in the Gold Ballroom, Palace Hotel, on Thursday, July 20. The inaugural was indicative of the lively interest which local men of the ship operating, shipbuilding and allied marine industries are manifesting in this first California chapter of the international organization.

Officially chartered just a few weeks ago, the details of setting up administrative officers, inviting charter applications and arranging initial program functions have progressed at remarkable speed. Evidence of this coordinated work of executive officers and directors was well rewarded in the enthusiastic response which characterized the "launching" meeting. The roster of charter members has already topped the one hundred and fifty mark . . . men highly representative of the city's leading maritime figures.

President Tirey Ford, executive of Swayne & Hoyt, Ltd., presented Honorary National President Arthur M. Tode, who came out to the Coast to attend the dedication ceremonies. Speaker Tode outlined the purposes of the Propeller Club of the United States, detailing the valuable work which is being accomplished in promoting the welfare of the American Merchant Marine. Particularly impressive were the speaker's reports of widespread educational work directed to the youth of the land. The mediums of poster and essay contests were accredited for fine accomplishments.

"Emphasizing the importance of the merchant marine to men in all vocations," said Mr. Tode, "has been one of our most constant responsibilities. The job of convincing the average American citizen that his welfare is aligned with that of the nation's commercial prosperity is one requiring the combined strength and influence of every one of our Ports. It is with great pride that we welcome San Francisco into membership with fellow-Propeller Clubs which now encompass the globe. We have abundant confidence in the work you will accomplish.

The official presentation of the new charter was made by National Vice-President Henry F. Gelhaus, selected for this singular honor by reason of his several years' service as representative of the national group in the South Pacific Coast region.

Mr. Gelhaus paid earnest tribute to the initiative of the leaders founding the San Francisco chapter, and gave the charter into the keeping of President Ford with his well

Welcome New Port of San Francisco

wishes for a long and fruitful career for the new Port.

Charter Members

Pacific Marine Review is privileged to present the names of charter members of the recently-created Propeller Club of the United States, Port of San Francisco:

Regnvald E. Astrup, George A. Armes, Julian Arntz, Capt. J. A. Alger.

Oscar J. Beyfuss, F. W. Blanch, Harry Harding Brann, Ralph B. Butterfield, Capt. Henry Blackstone, Starr Bruce, Frazer A. Bailey, R. F. Burley, Horace T. Beverly, Guy E. Buck, Major Edward H. Bowie.

Robert E. Christy, Philip A. Coxon, John Clerico, Wm. Cathcart, John H. Cordes, W. R. Chamberlin, H. Cartan, Jr., Capt. Christen Clausen, John Cushing, Wm. D. Conn, Charles G. Cox, Capt. D. B. Castle, Thos. Crowley, Robert J. Deremer, K. D. Dawson, R. A. Duncan, Fred L. Doelker, Bernard N. DeRochie, C. E. Dole, A. J. Dickie.

William C. Empey, Capt. L. M. Edelman, J. G. Euson.

Paul Faulkner, Robert H. Fouke, H. E. Frick, Charles E. Finney, Raymond O. Flood, Tirey L. Ford, Frank H. Fox.

Richard H. Glissman, F. B. Galbreath, Hugh Gallagher, Henry F. Gelhaus, John T. Greany, F. C. Gregory, A. S. Gunn, M. J. Gigy.

Edmund C. Hill, R. P. Hasenauer, E. N. W. Hunter, E. H. Harms, Byron L. Haviside, Russel Harry Haviside, Harry Thomas Haviside, James S. Hines, P. N. Harding, Charles Haseltine, Gene Hoffman, Charles Howard.

(From left) Arthur Tode, Edward Harms, Frazer Bailey, Tirey Ford, Henry Gelhaus, John Cushing, Capt. Henry Blackston, P. N. Harding.

H. A. Jeans, W. E. Jones, George Jordan, Thomas James, Jos. J. Jory.

Edmund T. King, C. C. Kriemler.

M. M. Levis, Neil S. Laidlaw, J. A. Lunny, John J. London, C. A. Lindh, Frank E. Lewis, W. G. Libbey, Wm. M. Laughton, Nat. Levy, Roger D. Lapham, Ira S. Lillick, Oliver Langton, C. M. LeCount, J. G. Ludlow, Capt. W. T. Lion.

A. M. McCarty, W. G. McAdoo, Jos. A. Moore, Jr., S. F. B. Morse, George G. Montgomery, Richard A. McLaren, W. Edgar Martin, J. F. McConkey, Fred McLean, J. F. Marias, Capt. Lewis Mesherry, C. L. Meek, E. C. Mausshardt, Fletcher Monson, Jos. A. Moore, R. W. Myers.

Herman D. Nichols, George K. Nichols, Capt. N. E. Nichols.

Frank J. O'Connor, Maxwell C. Orrisch, John J. O'Hare, Alonzo J. Owens, Max W. Orrisch.

John Parker, Albert F. Pillsbury, Byron O. Pickard, Carl E. Petersen, George A. Pope, Jr., John C. Piver, Arthur B. Poole, W. G. Perow.

Leslie M. Rudy, Carroll F. Reeves, W. P. Roth, Fred Ritchie, Charles Rogan, Almon E. Roth, R. C. Robinson.

James Scott, Richard Franklyn Schroeder, Joseph J. Schirmer, George B. Schirmer, Vernon S. Showell, Lloyd Swayne, Robert D. Spear, Irwin Scott, C. W. Saunders, Harry Scott, Jos R. Sheehan, L. K. Siversen, Geo. E. Sweet.

A. A. Tacchella, John P. Tibbetts, A. G. Townsend, A. K. Tichenor, Jos. Travers.

William H. E. Usher.

Walter J. Walsh, John Waddington, Clyde F. Williamson, Charles L. Wheeler, John P. Williams, Henry J. Wolters, L. H. Westdahl, E. V. Winter, Jas. H. Young.

Congratulations!

The Propeller Club's Port of San Francisco was greeted and acclaimed by a deluge of telegrams and letters received from nationwide sources on the day of the official christening.

President Tirey Ford reviewed congratulatory messages from many national maritime personalities, including the following:

Please accept my best wishes for the success of the Propeller Club Port of San Francisco which receives its charter today. Your work can be made a definite contribution to rehabilitation of our merchant fleet by urging our citizens to travel and ship under the American flag. I wish you the utmost success for the future.

E. S. LAND,
Chairman United States
Maritime Commission.

I send hearty greetings to the Propeller Club, Port fo San Francisco, on the occasion of the presentation of its Charter by The Propeller Club of the United States.

The laudable principle of promoting, furthering, and supporting the American Merchant Marine, as a cardinal point of your policy, receives my warmest support and commendation. The Navy has a direct and vital interest in the Merchant Marine. Sea defense requires an efficient Merchant Marine in national emergencies. Therefore, modern merchant ships with trained and well disciplined men comprise an important unit in all Naval planning.

I am sure that the Propeller Club of San Francisco will achieve a success compatible with the size of the great port it represents.

Very truly yours,
WILLIAM D. LEAHY,
Admiral, U. S. N.,
Chief of Naval Operations.

The building up of our merchant marine is, more than anything else, dependent upon unity of action among the many and diverse interests that are concerned in it. The Propeller Club movement is a most important factor in the promotion of unity of purpose and action in the building up of our merchant marine.

Please accept my congratulations upon its founding, and my best wishes for the success of the Propeller Club of the Port of San Francisco.

Sincerely yours,
J. M. JOHNSON,
Assistant Secretary,
Department of Commerce.

It is with genuine pleasure that I learn that the Port of San Francisco is now a member of the Propeller Club of the United States.

Naturally, I am deeply interested in all maritime matters and I know your Club, located as it is at the great harbor of San Francisco, will be of inestimable value in furthering the cause of the Propeller Club of the United States and in promoting the welfare of our Maritime industry.

I wish to extend to you and to your Club through you my heartiest congratulations on the organization of the Propeller Club for the Port of San Francisco and you may be assured that you have my best wishes for complete success in all of your problems pertaining to Maritime matters.

Yours very truly,
CARL VINSON,
Chairman,
House of Representatives,
Committee on Naval Affairs.

I desire to extend to you and all associated with you my heartiest congratulations on the occasion of the presentation to your group of a charter for the Propeller Club, Port of San Francisco. You have my best wishes for your success, and I know so well the interest of your city and your people in all matters maritime, that I feel that your success is assured.

I am acquainted with the splendid work of The Propeller Club of the United States and its various units in building and maintaining an American Merchant Marine. I do not know how we could get along without them. However difficult our obstacles may appear at times to be, I know that we can and will succeed if we shall maintain an unbroken and united front at all times.

I welcome you into the ranks of those who are determined to keep up the fight until Americans learn to ship and travel on American ships to a sufficient extent and in sufficient numbers to make our American Merchant Marine an assured success.

Yours very sincerely,
S. O. BLAND, Chairman,
House of Representatives
Committee on Merchant
Marine and Fisheries.

On this, the occasion of the presentation of a charter to The Port of San Francisco by the Propeller Club of the United States, may I congratulate you and the members of the Port upon being thus admitted to membership in a Club whose objectives denote rare possibilities for contributing to the welfare of the entire country, for the Propeller Club essentially is an instrument to the national welfare. It serves no one small or isolated group, but in its broad prosperity through the media of national cooperation and national education in support of a vital channel of American trade and prosperity—The American Merchant Marine.

The United States Coast Guard also is dedicated to this high purpose, and for that reason particularly, the Commandant has a deep interest in the Propeller Club and in its increasing effectiveness in the field of maritime affairs.

Sincerely yours,
R. R. WAESCHE,
Rear Admiral, U. S. Coast Guard,
Commandant.

Providing Walking Safety *On a Modern Tanker*

PERMANENT walking safety is assured in this modern galley on a modern tanker. Here and in the seamen's and officers' pantries a floor of Alundum Tile is providing maximum non-slip effectiveness—a floor that does not become slippery when wet, a floor that will not wear slippery even in the spots where traffic is concentrated.

Catalogs A and B will bring full information about Alundum Tiles and Catalog C about Alundum Aggregate for terrazzo.

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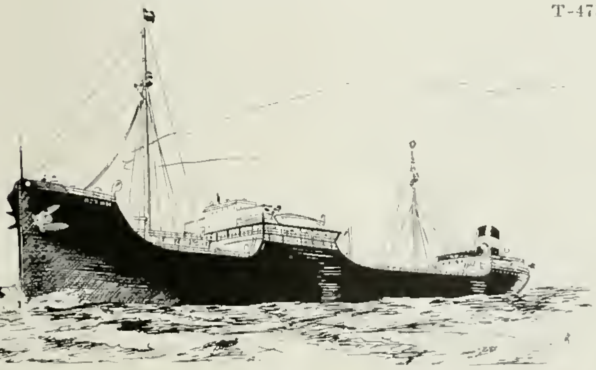

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VIA SAMOA-FIJI

Nothing is quite so delightful as that feeling of utter freedom that comes to you in Hawaii. Frequent sailings from San Francisco.

Fares: *(each way) San Francisco to Honolulu*
FIRST CLASS *from* $125 - CABIN CLASS *from* $85

Hotel reservations at the Royal Hawaiian or Moana at Waikiki Beach are made when booking steamer passage.

*MATSON SOUTH PACIFIC CRUISES to New Zealand and Australia via Hawaii, Samoa, Fiji. *Personally-escorted* every 4 weeks. Over 17,000 miles . . . 48 days . . . 12 fascinating shore excursions. All-inclusive-cost, complete cruise, First Class, from $775.

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THE OCEANIC STEAMSHIP COMPANY
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Los Angeles—A. C. Elder, 2714 South Hill St. — PRospect 9529

New York City—France Packing Company, Room 107-E, 30 Church St. — Cortlandt 7-6827

Original FRANCE METAL PACKING

Observations From The Crow's Nest

"NAMES AND NEWS" ★ BY BERNARD DeROCHIE

"ED" GILMORE ASSIGNED

Edwin S. Gilmore of Gilmore Steel & Supply Co., Inc., of San Francisco, is now specializing in marine sales and service for the San Francisco Bay District. For the past seven years Gilmore has occupied various positions at the firm's headquarters, 821-825 Folsom Street, during that time being in daily contact with both marine and industrial fields in Northern California.

W. G. "Bill" Gilmore is president of this fast growing organization, and McClelland "Mac" Gilmore is vice president. Ed Gilmore, in addition to his new duties working with the shipping and allied industries, is the company's secretary-treasurer.

Manufacturers and products for the marine market represented by the Gilmore Steel & Supply Co. are Wall Rope Works, Inc., Manila Rope; the Gilmore Organization's associated company, Pacific States Steel Company of Niles, California, makers of steel merchant bars and Gilmore fabricators for forming steel products; Pacific Wire Rope Company; Ohio Injector Company's brass and iron body valves; Bethlehem pipe; and Standard Tube Company's boiler tubes and stainless steel tubes.

NEW QUARTERS

Eugene V. Winter Co. of San Francisco is now located in new and improved quarters at 15 Drumm Street, just off California Street.

This well-known engineering sales and service organization represents the following manufacturers:

National Transit Pump & Machine Co.: Reciprocating and rotary pumps for marine, industrial and refinery service; Condenser Service & Engineering Co., Inc.: Heat exchanger specialists; Feed Water Heater and Evaporator Coils: Carried in San Francisco stock; The Maxim Silencer Company: All types of silencers and spark arresters for gasoline and diesel engines, and air compressors; Red Hand Compositions Co., Inc.: Marine bottom paints; Koppers Co.—American Hammered Piston Ring Division: Piston rings for gasoline, diesel and steam engines, air compressors; diameters from 1 inch to 120 inches, separately cast; and Blackburn, Smith Mfg. Co.: Feed water filters, grease extractors and strainers.

Edwin S. Gilmore

D. J. Erikson

SURVEY TRIP

Charles R. Allen, in charge of the South American lumber sales of J. J. Moore & Co., Inc., has sailed for a combined business and pleasure tour of the West Coast of South America that will take him to some fifteen ports of call in the Southern Hemisphere.

Accompanied by his wife, Mr. Allen will cruise down the Coast aboard the Latin America Line's flagship, the S.S. Romulus, for which J. J. Moore & Co., Inc., are agents. In the four months' duration of his trip, Mr. Allen expects to contact the important lumber buyers and import merchants of West Coast Latin America, to sound out general financial conditions and the prospects for increased good will and trade between those countries and the United States.

Mr. and Mrs. Allen will board the Romulus at Portland, Oregon.

HAGAN APPOINTS

Hagan Corporation has announced the appointment of **D. J. Erikson** as vice-president in charge of sales for the company and its subsidiary companies, Hall Laboratories, Inc., The Buromin Company, and Calgon, Inc.

The appointment came as a promotion to Mr. Erikson, who for a number of years has been serving in other capacities at Hagan—assistant to the president, sales manager of Calgon, Inc., and formerly sales manager devoting his efforts to the sale of Hagan Automatic Combustion Control alone.

Marine and Industrial Equipment

THOMAS A. SHORT CO.

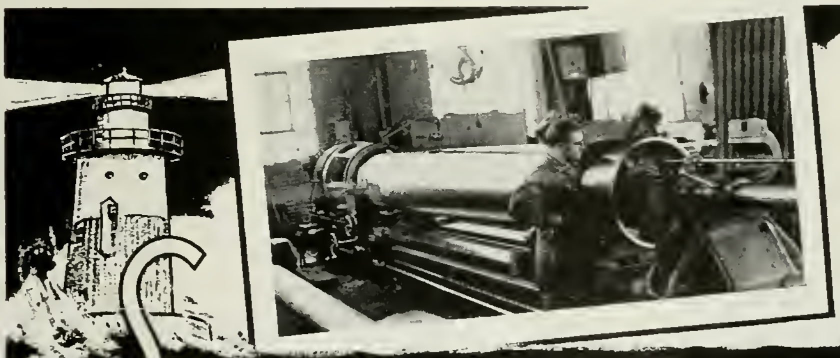
AMERCOAT SALES AGENCY
Corrosion and Acid Proof Sprayable Plastic Coatings for Concrete, Metal and Wood.
BACHARACH INDUSTRIAL INSTRUMENT CO.
Instruments for Pressure, Temperature and Gas Analysis.
BRIDGEPORT BRASS COMPANY
Condenser Tubes, Tube Sheets, Complete Line Copper and Brass.
CATERPILLAR TRACTOR COMPANY
Marine Diesel Power Plants and Marine Diesel Auxiliary Engines.
DIEHL MANUFACTURING COMPANY
Electric Motors, Generators, Fans and Ventilating Equipment.
HYDE WINDLASS COMPANY
Deck Machinery, Propellers and Hoisting Equipment.
INTER-COASTAL PAINT CORPORATION
Consol Rust Remover and Consol Paint.
MOVAL PRODUCTS COMPANY
Cleaner for Oil Tanks, Bilges and Heat Exchangers.
LUCIAN Q. MOFFITT, INC.
Goodrich Cutless Rubber Bearing.
WM. W. NUGENT & COMPANY
Oil Filters and Oiling Devices.
A. B. SANDS & SON COMPANY
Marine Plumbing.
SHENANGO-PENN MOLD COMPANY
Centrifugally Cast Metals and Alloys.
SHORT OIL DETECTOR
For Protection of Boilers.
SHORT OIL SEPARATOR
For Bilge and Ballast.
SMOLENSKY VALVE COMPANY
Radialflow Noiseless Check Valves for all Pressures.
SUBMARINE SIGNAL COMPANY
Fathometers for Yachts, Freighters and Passenger Vessels.
U. S. METALLIC PACKING CORPORATION
A complete Packing Service for Marine and Stationary Engineers.
VULCAN FOUNDRY COMPANY
High Tensile Pearlitic Cast Iron Founders, Pattern Makers, Manufacturers.
WELIN DAVIT & BOAT CORPORATION
Lifeboats, Davits, Lifeboat Winches and Floats.
WESTERN MAT & SUPPLY COMPANY
Rubber Mats for all Purposes.

Hyde Windlass Company

Steering Gears, Windlasses, Capstans, Bronze Propellers
—as installed on America's finest ships.

Bath, Maine

Pacific Coast Representative:
Thomas A. Short Co., 575 Howard Street, San Francisco



Specify "Shenango-Penn" Propeller Shaft Sleeves
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★ You will receive a *Centrifugal* casting of true analysis; uniform, dense, to size, pressure tested. Shipment 2-3 days.

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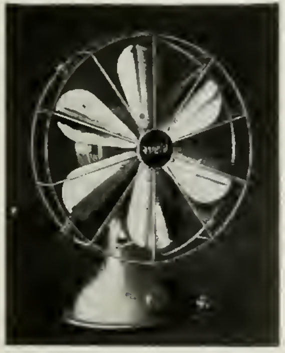

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DIEHL MANUFACTURING COMPANY

Electrical Division of
THE SINGER MANUACTURING CO.
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San Francisco Representatives:
MARINE ELECTRIC CO. — Desk and Wall Fans
THOMAS A. SHORT CO. — Motors, Generators, etc.

PROTECT YOUR MACHINERY with NUGENT FUEL and LUBE OIL FILTERS.....

20 times more filtering area than most filters . . . close, evenly woven textile . . . removes solids as small as .0004" . . . Filtering medium easily removed and cleaned for reuse. ALL the oil in circulation is filtered every cycle.

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Names and News

● K. S. Butler Joins McDonald Co.

The B. F. McDonald Company of Los Angeles announces the affiliation of **K. S. Butler,** who will be in charge of their Northern California and Nevada territories with headquarters at 1174 Howard Street, San Francisco.

Butler, formerly an engineer with the U. S. Bureau of Mines, is widely known in safety appliance and mining circles in the United States and Mexico. His 14 years of experience in these fields will be at the disposal of his many friends everywhere.

CHARLES J. LEHMAN

K. S. Butler

During the early part of July, Charles J. Lehman, pioneer operator of a steamship agency in Los Angeles, passed away in that city following an operation.

Mr. Lehman played an important part in the development of Los Angeles Harbor, recently celebrating his 50th anniversary in shipping at that port. Before his entrance into the agency field he was associated with various shipping enterprises, organizing the Crescent Wharf and Warehouse Company and being instrumental in aiding the Union Oil Company in locating the first storage tanks at the harbor. He represented the old Dollar Line, then the Holland-America and Royal Mail Lines. It was he who inaugurated the idea of lumber vessels carrying pasengers in coastwise trade.

As the Port of Los Angeles grew, the Portland Steamship Company and the North Pacific Line were added, and then, having sold his interest in the Crescent Wharf and Warehouse Company in 1912, Mr. Lehman established the Independent Steamship Company, operating between Los Angeles, San Francisco and Eureka. In 1916 he sold the line and became general manager of the Los Angeles Pacific Navigation Company, operating between Los Angeles and Singapore. He resigned this post later to open his own steamship agency.

CHAPTER XX ON AMERICAN COMMERCE

CHEMICALS

John Nickolaus, head of Metro-Goldwyn-Mayer's laboratories.

Old Egyptian alchemists sought to change lead, zinc, and copper into gold and to find a universal medicine to cure all human ills. Futile dreams led to some accidental discoveries, but not until the seventeenth century did man first discover an element—phosphorus—and true chemistry was born.

Today chemisry's synthetic resins and plastics give us telephone receivers, buttons, combs, and hundreds of other everyday articles. Through chemistry the life of the automobile tire has been increased from 5,000 miles to 20,000 miles, saving the American public no less than 3 billion dollars a year. Chemists grow vegetables without soil, produce soap without fats, and lenses without glass. Chlorine has practically eliminated dread epidemic diseases from our midst. Aluminum costs 20c, rather than $8 a pound. Each year the great chemical industry spends millions of dollars on research to bring us new and greater wonders.

The McCormick Steamship Company annually transports thousands of tons of chemicals to the East Coast of South America, between the Atlantic and the Pacific, and Pacific Coastwise. We are specially equipped to handle your products too, bulk or packaged, with care and dispatch.

4 ROUTES

McCORMICK STEAMSHIP COMPANY

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Eastern offices: Philadelphia, New York, Baltimore, Pittsburgh, Norfolk, Chicago, Detroit, and Buffalo.

ON THE LARGEST OCEAN LINER, the smallest pleasure craft, you can rely on Fultec Marine Finishes for every maintenance need. Into these technical finishes go all the scientific knowledge of specialized paint chemists, and the latest, highest-quality synthetic pigments, gums and resins And they're backed by the largest paint manufacturers in the west—with 88 years of experience. Give us your problems and we will gladly help you.

FULLER *they last* **PAINTS**

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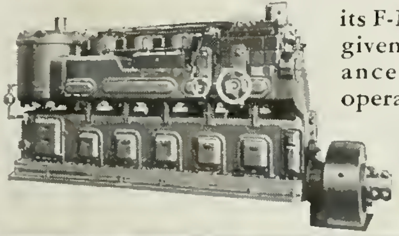
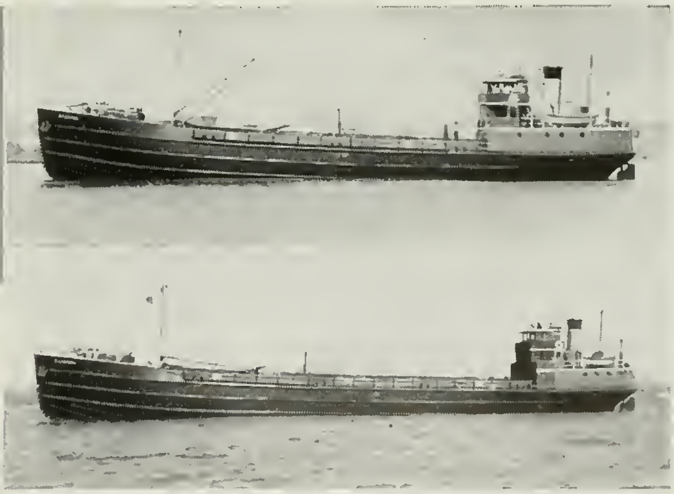
Spentonbush Again Chooses F-M Diesels

Experience with F-M Diesels in Other Vessels Determines Choice

The Spentonbush Fuel Transport Service, Inc. of New York now has in its fleet a total of ten motor tankers and twelve motor tugs engaged in harbor, canal, lakes, and coastwise service. That its F-M Diesel Engines have given dependable performance and provided many operating economies is evidenced by the fact that the tankers *S. T. Kiddoo* and *F. A. Verdon* are also equipped with Fairbanks-Morse Diesel main engines and auxiliary equipment.





Tanker *S. T. Kiddoo,* commissioned in 1938, is equipped with a 450-hp. 12 x 15 Model 37 6-cylinder F-M Diesel for propulsion power and two Model 36 F-M Diesels for auxiliary service.

F. A. Verdon, also commissioned in 1938, has a 450-hp. 12 x 15 Fairbanks-Morse Diesel for propulsion power and two other F-M Diesels for auxiliary service.

Whether you build—or convert—take advantage of the widest Diesel experience in the world by consulting *"Diesel Headquarters."* Write Fairbanks, Morse & Co., Dept. 109, 600 S. Michigan Avenue, Chicago, Illinois. Branches with service stations in principal ports.

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STOKERS
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Diesels

Building in American Yards

Pacific Coast

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Shipbuilding Division
(Union Plant)
San Francisco

DRYDOCK AND ROUTINE REPAIRS: Associated, Knud Rasmussen, M.S. Bralanta, M.S. Tolten, Vitus Bering, Maui, Onomea, Fr. Str. Wisconsin, U.S.C.G.C. Daphne, Peter Lassen, K. R. Kingsbury, Tug W. B. Storey, Jane Christenson, Mauna Kea, M.S. G. C. Brovig, Liloa, Makiki, Honomu, Frank G. Drum, U.S.S. California, Yacht Contender, M.S. Brajara.

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Foot of Eighth St.
San Diego, Calif.

DRYDOCK AND ROUTINE REPAIRS: California, San Joaquin, American Beauty, Rajo, Invader, Balboa, Dependable.

FELLOWS & STEWART, INC.

Wilmington, Calif.

DRYDOCK AND ROUTINE REPAIRS: Cruiser Clarinda, Yachts Dwyn Wen and Astrild, Tug Lebec, Calif. F. & G. Comm. Patrol Boat Bluefin, Tug Crowley No. 26; 67 small yachts, motorboats and commercial craft.

GENERAL ENGINEERING & DRY DOCK CO.

Foot of Fifth Avenue
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DRYDOCK AND ROUTINE REPAIRS: Barbara C, Davenport, Survey Boat E. W. Scripps, Esther Johnson, Lake Miraflores, Gas. S. Contra Costa, Lightship No. 76, Lumbertown.

HONOLULU IRON WORKS

Honolulu, T. H.

DRYDOCK AND ROUTINE REPAIRS: Tug Mamo, M.S. Manuwai, Tug Momi, M.S. Moi, Tug Mikiala.

LAKE WASHINGTON SHIPYARDS

Houghton, Wash.

NEW CONSTRUCTION: 200 foot steam geared turbine steel survey ship Explorer for U. S. Coast & Geodetic Survey. Estimated delivery date January 1, 1940.

Timber work on two caissons for Tacoma Narrows Bridge.

LOS ANGELES SHIPBUILDING & DRY DOCK CORP.

Los Angeles Harbor
San Pedro, Calif.

DRYDOCK AND ROUTINE REPAIRS: Pat Doheny, M.V. Minato Maru, Agwiworld, Sunset Pacific Barge C-1, G. P. Barge No. 3, M.V. Evita, M.V. Manju Maru, M.V. Keisho Maru, M.V. Nohi Maru, M.V. Taian Maru, M.V. Kumi Maru, Yacht Maria Dolores, Los Angeles, Cathwood, Cabrillo, Yacht Enchantress, Bahrein, Martin Bakke, Deroche.

MARE ISLAND NAVY YARD

Mare Island, Calif.

NEW CONSTRUCTION:

Swordfish, Submarine (SS193); keel laid October 27, 1937; launched April 1, 1939; estimated delivery date August 1, 1939.

Two harbor tugs, YT 133 and YT 134; keels laid September 29, 1938; launched May 4, 1939; completed June 16 and June 23, respectively.

Order received for construction of one submarine tender, Fulton (AS 11); dated June 30, 1938.

Order received for construction of one submarine, Tuna (SS203); dated June 30, 1938.

Order received for construction of one submarine (SS211), dated June 2, 1939.

DRYDOCK AND ROUTINE REPAIRS: Pensacola, New Orleans, Conyngham, Macdonough, Worden, Perry, Zane, Wasmuth, Trever, Dewey, Farragut, Boggs, Lamberton, Unadilla, Ortolan, Relief, Nitro, Medusa, Ellery W. Niles.

THE MOORE DRY DOCK CO.

Oakland, Calif.

NEW CONSTRUCTION:

Hulls Nos. 193, Walnut, and 194, Fir, two lighthouse tenders for Bureau of Lighthouses; LOA 174′ 10½″, beam molded 32′, depth 14′ 6″. Twin screw triple expansion engines; water tube boiler; 1000 horsepower. One for Pacific Coast; one for Great Lakes. Keels laid December, 1938; launched March, 1939; delivery dates August 24 and September 14, 1939, respectively.

Hulls Nos. 195 and 196, two cargo vessels for U. S. Maritime Commission; LOA 492′ 0″, LBP 465′, breadth molded 69′ 6″, depth molded 42′ 6″, SHP normal 8500, SHP max. 9350, dis. 17,600 tons, deadweight 11,926 tons; steam turbine propelled. No. 195, keel laid March 18, 1939.

DRYDOCK AND ROUTINE REPAIRS: Canadian, Puerto Rican, Delawarean, Utahan, Santa Monica, Elizabeth, Frances, Port of Stockton, Capt. W. A. Lucas, Disa, Maltha, Wisconsin, Arizonan, Weser, Sobre Los Olas, President Garfield, Thorshavn, Maliko, Point Bravo, Oregonian, Silverwalnut, Silverpalm, West Planter, Point Arena, Hayward, Vancouver, Point Chico, Iowan, Pennsylvanian, Purse Seiner American Rose, Point Lobos, President Coolidge, Santacruzcement, Missourian, Illinoian.

THE PUGET SOUND NAVY YARD

Bremerton, Washington

NEW CONSTRUCTION:

U.S.S. Wilson (Destroyer No. 408); standard displacement, 1500 tons; keel laid March 22, 1937; launched April 12, 1939; commissioned July 5, 1939.

U.S.S. Charles F. Hughes (Destroyer No. 428); standard displacement 1600 tons; order placed by Navy Department December 7, 1937. Keel laid January 3, 1939.

Ships authorized, work not started: Woban (YT138), harbor tug; Ala, (YT139), harbor tug; Barnegat (AVP10), seaplane tender; Biscayne (AVP11), seaplane tender; Monssen (DD436), destroyer; AVP12; AVP13.

DRYDOCK AND ROUTINE REPAIRS: Maryland, Salt Lake City, Pyro, Utah, Houston, Minneapolis, Astoria.

TODD SEATTLE DRY DOCKS, INC.

Harbor Island
Seattle, Wash.

DRYDOCK AND ROUTINE REPAIRS: Jacob Luckenbach, West Notus, Condor, Harry Luckenbach, Tyee, Bering.

WESTERN BOAT BUILDING CO., INC.

2505 East 11th Street
Tacoma, Wash.

NEW CONSTRUCTION:

Hull No. 134, tuna clipper 90′ x 24′ x 13′; 275 H.P. Union Diesel. Launching date February 15, 1939.

Hull No. 136, purse seine fishing boat 96′ x 22′, powered by 240 H.P. Atlas Diesel engine. Keel laid January 30, 1939; launching date March 1, 1939.

Atlantic, Lakes, Rivers

AMERICAN BRIDGE COMPANY

Pittsburgh, Pa.

NEW CONSTRUCTION:

One relay barge 104′ x 34′ x 8′ for the Panama Canal. Delivery date January 1, 1940.

Fifteen double deck covered barges 198′ x 35′ x 11′ for Mississippi Barge Line Co., St. Louis, Mo.

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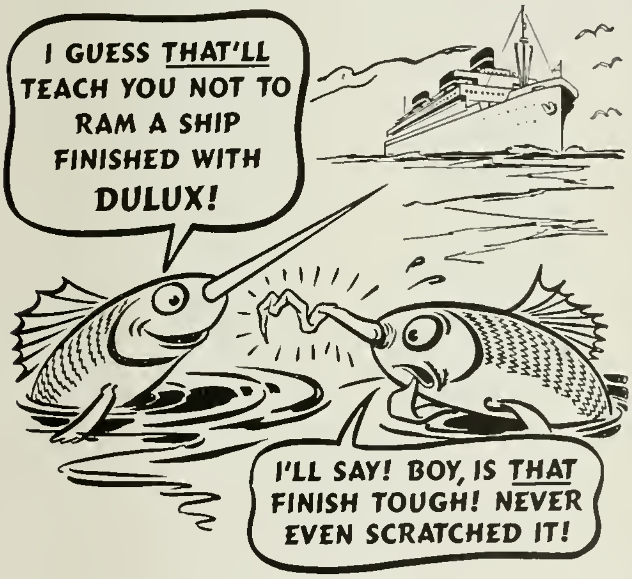
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BATH IRON WORKS
Bath, Maine

NEW CONSTRUCTION:

Hulls Nos. 170-171, DD409, Sims, and DD410, Hughes, two 1500-ton destroyers for U. S. Navy; contract date October 12, 1936; keels laid July 15 and September 15, 1937, respectively; launching dates, April 8 and June 17, 1939, respectively; **delivery dates, July** and September, 1939, respectively.

Hulls Nos. 177 and 178, DD423 and DD424, two 1620-ton destroyers for U. S. Navy. Contract date September 30, 1937; delivery dates April and June, 1940, respectively.

Hulls Nos. 180-181, DD429 and DD430; two 1620 ton destroyers for U. S. Navy. Contract dated August 15, 1938; delivery dates, December, 1940, and February, 1941, respectively.

Hulls Nos. 182-183, DD437 and DD438, two 1620-ton destroyers for U. S. Navy. Contracts dated June 15, 1939. Delivery dates June 15, 1941, and August 15, 1941.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Fore River Yard
Quincy, Mass.

NEW CONSTRUCTION:

CV7, Wasp, Airplane Carrier for U. S. Government; keel laid April 1, 1936; launched April 4, 1939.

Hulls Nos. 1468, Ancon; and 1469, Cristobal; two passenger and freight steamers for Panama Railroad S.S. Co.; 486 feet x 64 feet x 38 feet 6 inches; 16½ knot speed. Keels laid, No. 1468, October 25, 1937; No. 1469, November 15, 1937; launching dates, December 10, 1938, and March 4, 1939. **No. 1468 delivered June 16, 1939.**

Hulls Nos. 1470 and 1471, two 1500-ton destroyers for U. S. Government; delivery dates March, 1940 and May, 1940.

Hulls Nos. 1474, 1475, 1476 and 1477, four freight vessels for American Export Lines, Inc.; 450' B.P. x 66' x 42'3"; 16½ knots; geared turbines and water tube boilers. Keels laid, No. 1474, November 10, 1938; No. 1475, December 16, 1938; No. 1476, March 16, 1939.

Hull No. 1478, Massachusetts; 35,000 ton battleship for U. S. Navy.

Hulls Nos. 1479 and 1480, two 6000-ton cruisers for U. S. Government.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Sparrows Point Yard
Sparrows Point, Md.

NEW CONSTRUCTION:

Hulls Nos. 4329, Platte, 4330, 4331; three 16,300 dwt. ton tankers for Standard Oil Co. of N. J.: 18 knots speed. Contract signed January 3, 1938. **No. 4329 launched July 8, 1939.**

Hull No. 4333, Mobilube; 16,100 dwt. tanker for Socony Vacuum Oil Co. Contract signed February, 1938. Launched April 29, 1939: **delivered June 30, 1939.**

Hulls Nos. 4337-4339, three passenger and cargo ships for Mississippi Shipping Co. Contract signed December 21, 1938. Keels laid No. 4337, April 10, 1939: No. 4338, May 8, 1939.

Hull No. 4340, tanker for Union Oil Co. of Calif. Contract signed May 1, 1939.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Staten Island Yard
Staten Island, N. Y.

NEW CONSTRUCTION:

Hulls Nos. 8001, Navajo; 8002, Seminole; and 8003, Cherokee—three U. S. Navy fleet tugs. No. 8001, keel laying date December 12, 1938; **launching date August 17, 1939;** delivery date February 15, 1940. No. 8002, keel laying date December 16, 1938; launching date September 15, 1939; delivery date April 15, 1940. No. 8003, keel laying date December 23, 1938; launching date October 14, 1939; delivery date June 15, 1940.

BOSTON NAVY YARD
Boston, Mass.

NEW CONSTRUCTION:

DD402, Mayrant, and DD403, Trippe, two light destroyers for United States Navy: LBP 334', beam 35'6" depth 19'8"; keels laid April 15, 1937; launched May 14, 1938; estimated delivery dates October 14, 1939, and indefinite.

DD415, O'Brien, and DD416, Walke, two destroyers; LBP 341', beam 36', depth 19'8"; keels laid May 31, 1938; launching date September, 1939; delivery dates May 12, 1940, and July 12, 1940.

DD425, Madison, and DD426, Lansdale, two destroyers; 341'0" x 36'0" x 19'8". Keel laying date December 19, 1938; launching date September, 1939; delivery dates October 30 and December 30, 1940.

DD433 and DD434, two destroyers, 341'0" x 36'0" x 19'8", contract awarded July 23, 1938. Keels laid June 1, 1939; launching date February 1, 1940; completion dates June 1, 1941, and August 1, 1941.

DD441 and DD442, two destroyers; contract awarded May 29, 1939; completion dates July, 1941, and September, 1941.

BROOKLYN NAVY YARD
Brooklyn, N. Y.

NEW CONSTRUCTION:

CL 50, Helena, light cruiser; L.B.P. 600' beam 61'7¾", standard displacement 10,000; geared turbine engines; express type boilers; keel laid December 9, 1936; launched August 27, 1938; estimated delivery November 2, 1939.

BB 55, North Carolina, battleship; L.B.P. 714' 0", beam to outside armor 108' 0", std. displ. 35,000 tons: geared turbine engines; express type boilers. Keel laid October 27, 1937; estimated launching date March 1, 1940; contract delivery September 1, 1941; estimated delivery date October 15, 1941.

Battleship No. 61, order placed June 2, 1939; to be built under authority of Naval Appropriation Act for year 1940. Building period 49 months, beginning July 1, 1939.

CHARLESTON, S. C., NAVY YARD
Charleston, S. C.

NEW CONSTRUCTION:

One harbor tug, Massasoit (YT131); LOA 110', beam 24'; authorized August 12, 1937: keel laid July 25, 1938; launched December 13, 1938.

One harbor tug, Heekon (YT141); LOA 100', beam 25'; authorized July 7, 1938.

One harbor tug, Nokomis (YT142); LOA 100', beam 25'; authorized July 7, 1938.

Four destroyers.

DEFOE BOAT & MOTOR WORKS
Bay City, Mich.

NEW CONSTRUCTION:

Hull No. 166, sub-chaser PC-451, for U. S. Navy. Diesel driven; 170' x 21' 6". General Motors engines; steel construction. Delivery date June, 1940.

THE DRAVO CORPORATION
Engineering Works Division
Pittsburgh, Pa., and Wilmington, Del.

NEW CONSTRUCTION:

Hull No. 1489, one welded ash removal barge for Dept. of Sanitation, City of N. Y.; 150' x 37'; 553 gross tons.

Hull No. 1543, one 25-ton floating crane for Navy Dept. Bureau of Yards & Docks; 335 gross tons.

Hulls Nos. 1549-1555, seven welded steel coal barges 175' x 26' x 10' 8" for stock; 3304 gross tons.

Hulls Nos. 1560-1561, two double bottom cargo barges 175' x 26' x 11' for stock; 1060 gross tons.

Hulls Nos. 1562-1567, six welded flush deck cargo box barges 100' x 26' x 6' 6" for stock; 990 gross tons.

Hull No. 1568, one pontoon type whirler boat 60' x 53' 2" x 7' for stock; 188 gross tons.

Hulls Nos. 1569-1572, four welded flush deck cargo box barges 130' x 30' x 7' 6" for stock; 1000 gross tons.

Hulls Nos. 1573-1574, two welded steel coal barges 134' x 34' x 17' for stock, 1534 gross tons.

Hulls Nos. 1575-1577, three welded steel oil barges 195' x 35' x10' 6" for stock; 1833 gross tons.

ELECTRIC BOAT CORP.
Groton, Conn.

NEW CONSTRUCTION:

Hull No. 31, Spearfish (SS190); standard displacement 1450 tons; keel laying date September 9, 1937; launching date October 19, 1938; **delivered July 17, 1939.**

Hull No. 33, Seadragon (SS194); 1450 tons; keel laying date April 18, 1938; launched April 21, 1939; delivery date December, 1939.

Hull No. 34, Sealion (SS195); 1450 tons; keel laying date June 20, 1938; launched May 25, 1939; delivery date February, 1940.

Hull No. 35, Tambor (SS198); standard displacement 1475 tons; keel laying date January 16, 1939; delivery date January, 1941.

Hull No. 36, Tautog (SS199); standard displacement 1475 tons; keel laying date March 2, 1939; delivery date March, 1941.

Hull No. 37, Thresher (SS200); standard displacement 1475 tons; keel laying date May 15, 1939; delivery date May, 1941.

Hull No. 39 (SS206); standard displacement 1475 tons.

Hull No. 40 (SS207); standard displacement 1475 tons.

Hull No. 41 (SS208); standard displacement 1475 tons.

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Kearny, N. J.

NEW CONSTRUCTION:

One destroyer, DD412 Hammann; keel laid January 17, 1938; launching date February 4, 1939.

Hulls Nos. 152 and 153, two tankers for Standard Oil Co. of New Jersey; keels laid July 15, 1938, and March 13, 1939. Launching date, No. 152, April 29, 1939.

Hulls Nos. 154-159, six C-2 cargo vessels for U. S. Maritime Commission. Keels laid, No. 154, August 25, 1938; No. 155, September 20, 1938; No. 156, January 3, 1939; No. 157, March 16, 1939; Nos. 158 and 159, May 26, 1939; **launching dates,** Nos. 154 and 155, May 20, 1939; **No. 156, July 15, 1939.**

Hulls Nos. 160 and 161, two torpedo boat destroyers for the United States Navy. Keels laid March 1, 1939.

Hulls Nos. 162-167, six C-3 cargo vessels for U. S. Maritime Commission. Keel laid, No. 162, May 8, 1939.

Hulls Nos. 168-169, two 6000 ton cruisers for U. S. Navy.

Hulls Nos. 170-171, two torpedo boat destroyers for the United States Navy.

LEVINGSTON SHIPBUILDING CO.

Orange, Texas

NEW CONSTRUCTION:

One twin screw tunnel-type shallow draft towboat; LOA 100′, beam OA 24′ 8¾″, depth 7′ 3″; powered with two 275 H.P. Atlas diesel engines; for Asiatic Petroleum Corp., N. Y., N. Y. **Delivery date August, 1939.**

One all welded towboat; LOA 80′, beam OA 22′ 7″, depth 9′ 6″. Powered by 550 H.P. diesel. For W. G. Coyle & Co., New Orleans, La.

THE NEW YORK SHIPBUILDING CORPORATION

Camden, N. J.

NEW CONSTRUCTION:

One destroyer tender for U. S. Navy; order placed December 27, 1937. Launched May, 1939.

One seaplane tender for U. S. Navy; order placed December 27, 1937.

One destroyer tender for U. S. Navy; order placed October 14, 1938.

One seaplane tender for U. S. Navy; order placed October 14, 1938.

One battleship for U. S. Navy; order placed December 1, 1938. Keel laid July, 1939.

NEWPORT NEWS SHIPBUILDING & DRYDOCK CO.

90 Broad Street, New York

NEW CONSTRUCTION:

Hulls Nos. 363-364, two destroyers, Nos. 413, Mustin, and 414, Russell; keels laid December, 1937; launched December 8, 1938.

Hull No. 369, twin screw mail, passenger and cargo liner for United States Lines Co.; length 723′, beam 92′, depth 45′. Keel laid August 22, 1938; **launching date August 31, 1939.**

Hulls Nos. 370, 371 and 372, three oil tankers for Standard Oil Company of New Jersey; gross tonnage about 11,500 tons; L.B.P. 525′, breadth molded 75′, depth molded 39′. Keels laid, No. 370, January 16, 1939; No. 371, May 8, 1939.

Hulls Nos. 373, 374, 375 and 376, four single screw cargo vessels for United States Maritime Commission; turbine propulsion; gross tonnage about 9000 tons; length 435′, breadth 63′, depth 40′ 6″. Keels laid, No. 373, November 14, 1938; No. 374, November 28, 1938; No. 375, March 6, 1939; No. 376, May 1, 1939. Launching dates, No. 373, April 28, 1939; No. 374, June 21, 1939.

Hull No. 378, battleship, 58, Indiana, for U. S. Navy.

Hulls Nos. 379, 380, 381, 382, 383 and 384, six single screw combination passenger and cargo vessels for U. S. Maritime Commission; length 465′, breadth 69′ 6″, depth 42′ 6″, gross tonnage about 8000 tons.

Hull No. 385, aircraft carrier No. 8, Hornet, for U. S. Navy.

SUN SHIPBUILDING AND DRY DOCK COMPANY

Chester, Pa.

NEW CONSTRUCTION:

Hulls Nos. 176-180, five single screw diesel cargo vessels, C-2 design, for U. S. Maritime Commission; equipped with Sun-Doxford engines. **Delivery dates, No. 176, July 20, 1939 (est.); No. 177, August 7, 1939; No. 178, August 25, 1939;** No. 179, September 15, 1939; No. 180, October 15, 1939.

Hull No. 181, single screw steam turbo electric drive tanker for Atlantic Refining Co.; 521′ x 70′ x 40′. Keel laid November 21, 1938; **launched July 29, 1939;** delivery date September 1, 1939.

Hulls Nos. 182, 183, 184 and 185, four single screw diesel cargo vessels for U. S. Maritime Commission, C-3 design. Equipped with Busch Sulzer engines. Delivery dates November 15, 1939; December 20, 1939; January 20, 1940, and February 20, 1940.

Hulls Nos. 186-189, four C-3 single screw combination passenger and cargo vessels; diesel propelled; equipped with Sun-Doxford engines. Delivery dates October 6, 1940; December 5, 1940; February 3, 1941, and April 4, 1941.

One 16-knot tanker for Texas Co.; 13,285 tons dwt. Delivery date June, 1940.

PORTSMOUTH, N. H., NAVY YARD

Portsmouth, N. H.

NEW CONSTRUCTION:

Four submarines, Searaven, Seawolf, Triton and Trout.

THE PUSEY & JONES CORP.

Wilmington, Del.

NEW CONSTRUCTION:

Hull No. 1071, one steel lighthouse tender, Lilac Class, for Dept. of Commerce, Bureau of Lighthouses. Gross tonnage approximately 700 tons. Keel laid October 17, 1938; **completion date July 5, 1939.**

Two streamlined diesel tugs for Curtis Bay Towing Company; powered by 320 H.P. Enterprise engines; cost $200,000.

TAMPA SHIPBUILDING & ENGINEERING CO.

P. O. Box 1838

Tampa, Fla.

NEW CONSTRUCTION:

Hulls Nos. 33-36, four C-2 type cargo vessels for U. S. Maritime Commission; 435′ x 63′ x 31′ 6″; 9291 dwt. tons; diesel powered; cost $1,815,663 each.

Trade Literature

Marine Deaerating Heaters, publication No. 2900 of the Cochrane Corporation. A 29-page booklet discussing the protection of the marine steam boiler plant against corrosion and describing the Cochrane deaerating feed water heaters.

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The Thomas A. Short Company are marine representatives at San Francisco.

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PACIFIC MARINE REVIEW

SEPTEMBER, 1939

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PACIFIC MARINE REVIEW

Contents-September, 1939

Editorial Comment:
- An Open Letter from the Waterfront Employers 17
- The Present Position of the American Merchant Marine 18
- Let's Speed Up Our Merchant Navy 18

The Seagoing Dredge Chester Harding 20

C-1 Vessels of the U. S. Maritime Commission 24

Tanker Associated Saves a Shipload of Souls—Saves Many Barrels of Fuel 30

Your Problems Answered 32
By "The Chief."

Steady as You Go! 35
Progress in the Art of Navigation.

Progress in the Motorship 36

A Notable New Pacific-European Motorship 38

Export Vessels Install "Cargocaire" System 40

An Old Problem Solved by Simple Device 41

Shipbuilding at Long Beach 42

An Economical River and Harbor Tug 43

On the Ways 44
Latest News from American Yards.

Beachcomber's Loot 47

Building in American Yards 58

Miscellaneous: Stainless Clad Steel, 28; New Method of Invisible Branding for Secret Identification, 34; Engineers' Licenses for June, 34; Deck Officers' Licenses for June, 37; Change of Masters, 37; Trade Literature, 39, 41, 56, 62; The New Porous Rubber, 40; Pocket-Size CO_2 Indicator, 46; Trade Notes, 56; Social Security Under an Old Deal, 56.

PUBLISHED AT 500 SANSOME STREET. . . . . SAN FRANCISCO

Entered as second class matter June 20, 1913, at the post office, San Francisco, under the Act of March 3, 1879. Published on the 1st of each month. Advertising and editorial forms close on the 15th. Subscription price, one year: Domestic, $1.50; foreign, $2.50; two years: Domestic, $2.50; foreign, $4.00; three years: Domestic, $3.00; foreign, $5.50; single copies, 25c. Chas. F. A. Mann, Northwest Representative, 1110 Puget Sound Bank Bldg., Tacoma, Washington. New York Office, Suite 404-405-406, Two Hundred Broadway, Telephone COrdlandt 7-3579.

In New York City copies of Pacific Marine Review can be purchased at the news stands of I. Goldberg, 42 Broadway; Harry Nash, 17 Battery Place; Philip Mandara, Greenwich Street and Battery Place. In Washington, D. C., at the news stand of the Carlton Hotel, 16th and K Streets.

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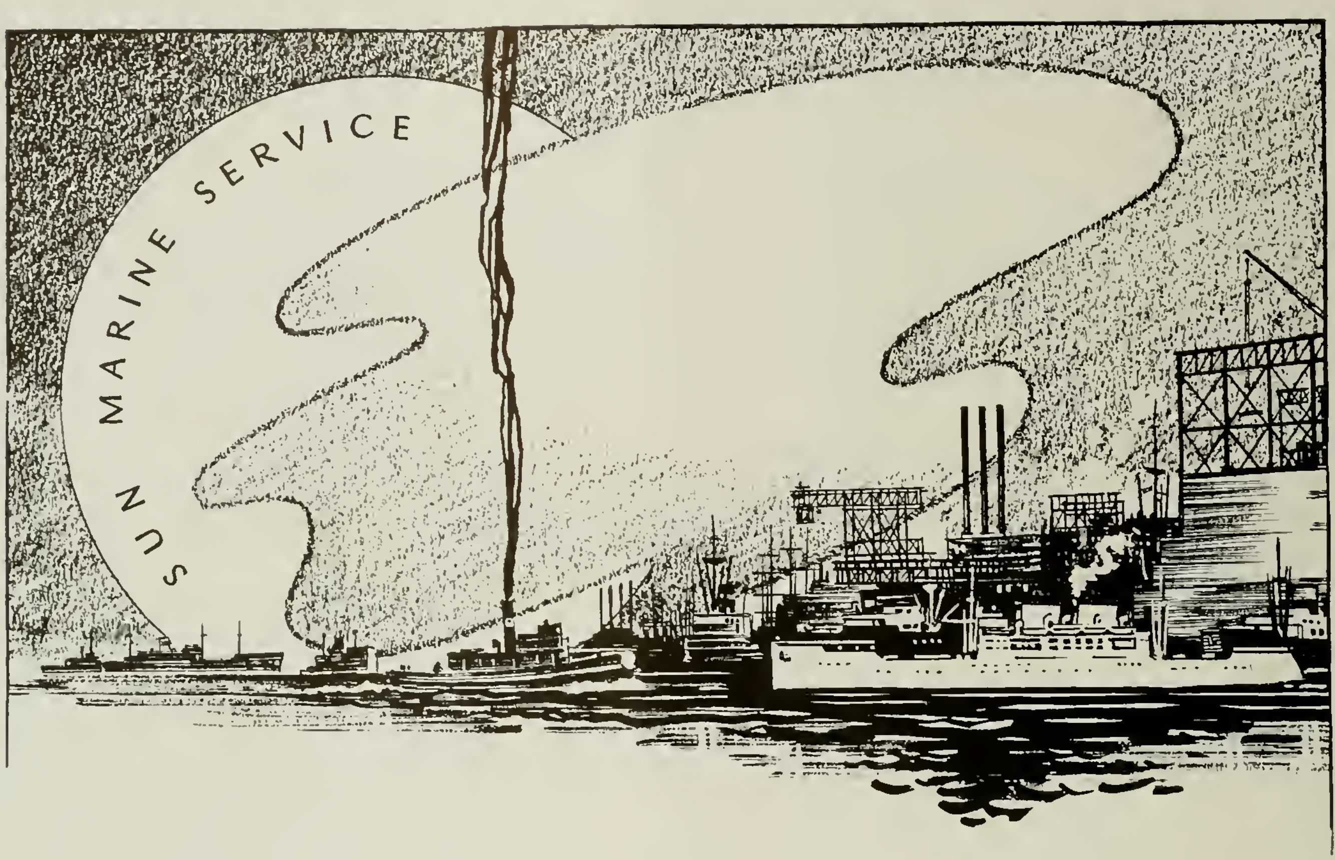

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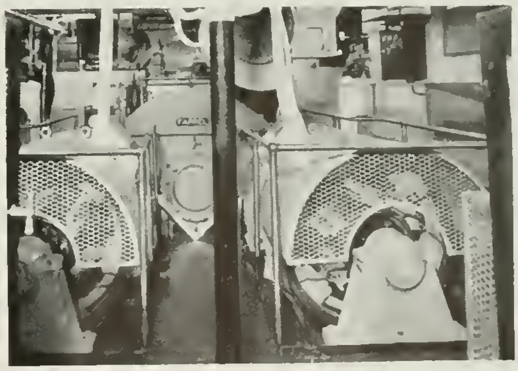
- **Upper left**—the Sheila Moran performing the nearly unbelievable task of towing the Ile de France at a speed of 4 knots.
- **Above**—the Peter Moran running at full speed.
- **Below**—the electric propulsion motors and Farrel reduction gear in the Moran tugs.



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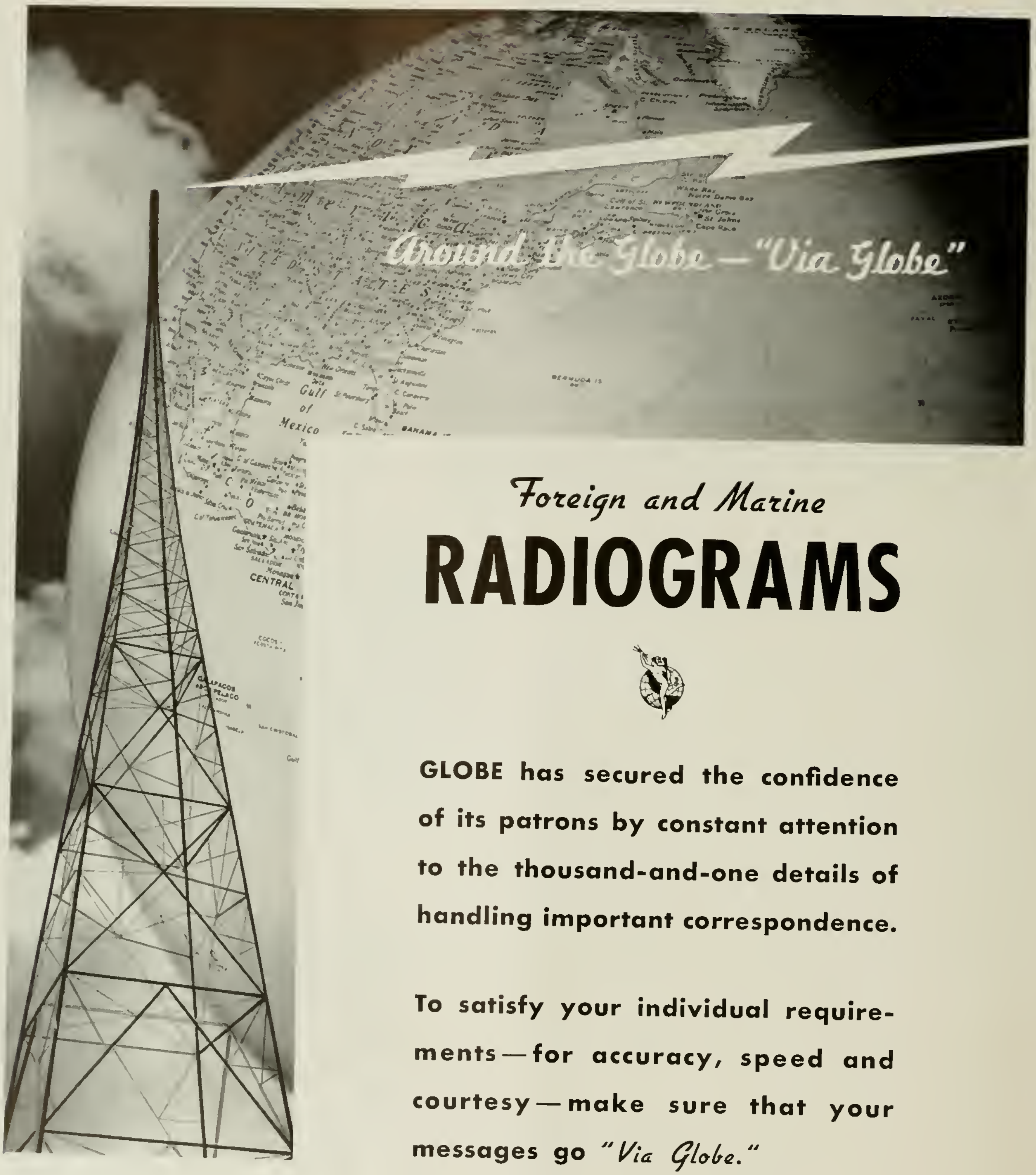

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PACIFIC MARINE REVIEW

VOLUME 36
No. 9

SEPTEMBER
1939

An Open Letter From the Waterfront Employers

rom: The Waterfront Employers' Association of the Pacific Coast.

o: The International Longshoremen's and Warehousemen's Union, District No. 1, San Francisco, Calif.

This will confirm our offer, repeated today (Augist 9), to renew our longshore contract for another ear from September 30, 1939.

Our mutual interests require prompt and positive ssurance to shippers that there will be no interrupion in service; otherwise there will soon be no caroes for the ships and no work for longshoremen.

The uncertainty concerning our contract renewal as already made itself felt.

In the intercoastal trade September and October ookings are being cancelled in favor of other forms f transportation.

In the European, Hawaiian, transpacific and South merican trades cargoes are being diverted to and rom other ports, notably British Columbia, and Paific Coast industry is losing markets to foreign cometitors.

It is imperative, therefore, that our negotiations be ressed as rapidly as possible.

Proceeding now to your specific proposals:

Vages.

Pacific Coast longshoremen receive 95 cents per our straight time for the first six hours worked beween 8 a. m. and 5 p. m., and $1.40 per hour for ll other hours worked. As a result, they receive the ighest longshore earnings in the world.

Despite these wages and earnings, the employers re now securing just about half the work per hour hat they formerly did, the deliberate results of an rganized efficiency slow-down.

Hours.

Pacific Coast longshoremen already enjoy the sixour day. No shorter work day is known in any inlustry. You now propose to require overtime wages or all work done after three o'clock in the afternoon.

The only justification ever offered for the six-hour lay is to spread work opportunity and earnings.

In truth it has been used to increase overtime.

Your proposal would permanently freeze that inrease and, by requiring overtime wages for all work done after the middle of the afternoon, still further increase the highest wages of their kind in the world.

Termination Date.

Our present longshore contract was made for the term of one year, ending next September 30, with provision for renewal from year to year. That is the termination date of virtually all of our maritime labor agreements.

Shipping cannot stand uncertainty.

If the longshore agreement were altered, as you propose, to fix a new termination date, the negotiation periods would be protracted, and the uncertainties and losses that now surround a single termination date would be multiplied.

The interest and convenience of the public are not served in any such creation of doubt and worry as to the continuity of the industry's services.

Mechanical Equipment.

Your position is not justified by our experience of the past five years. In fact, instead of men having been displaced, your registration has increased over the period. In fact, instead of a decrease in earnings, the annual earnings per man are several hundred dollars more than they were in 1934.

Penalties.

The record in recent years of quickie strikes and job-action in violation of our contracts makes it more necessary than ever that penalties be imposed for the longshoremen's failure to observe their agreement.

The employers cannot continue to be bound by contracts which the longshoremen disregard, and the employers, therefore, decline to waive the penalty provisions of the present contracts.

In short, **Pacific Coast longshoremen get the highest wages, work the shortest hours, and enjoy the best working conditions of any longshore group in the world, and to the best of our belief they do less work.**

The employers, therefore, advise you that your proposals for amending the agreement are rejected.

They urge once more, in the evident interest of all concerned, longshoremen, emloyers, shippers and public, that the contract be at once renewed.

Yours truly,

F. P. FOISIE.

The Present Position of the American Merchant Marine

At the Semi-Annual Meeting of the Board of Managers of the American Bureau of Shipping on July 25, 1939, at New York, President J. Lewis Luckenbach made the following remarks concerning the American shipping and shipbuilding position:

"At this time it seems fitting to review the progress of the American Merchant Marine since passage of the Merchant Marine Act 1936 and to appraise, if possible, its present position as compared to that prior to the enactment of the law, as well as its present standing with respect to the merchant marines of other countries.

"Very little appears to have been accomplished with respect to the protected coastwise and intercoastal trades, no new tonnage having appeared in the last few years in these services. The outlook for these branches of our merchant marine is most confused. Much legislation has been introduced in this Congress affecting the coastwise and intercoastal trades along the lines of increased rate regulation and restriction of the volume of tonnage and it commences to look as if these branches of our merchant marine will eventually have to accept some form of regulation similar to that enforced on railroads by the Interstate Commerce Commission. There is a wide difference of opinion as to the wisdom of the Government's course, some of the pressure for such legislation originating in the steamship lines themselves but more of it apparently originating with the railroads which are extremely jealous of expansion of the coastwise and intercoastal steamship services as well as the services on rivers and the Great Lakes. Impartial examination of the matter would appear to indicate that the main difficulty of the coastwise and intercoastal operators has arisen from an oversupply of tonnage, most of which made its appearance in the business out of the surplus of war built ships, at a cost to the purchasers which permitted them to operate at rates so low as to preclude the possibility of building new and suitable tonnage.

"The most encouraging feature of the future prospects for the coastwise and intercoastal trade lies in the fact that the present Maritime Commission has withheld laid-up ships from these services. It is to be hoped that this policy will be adhered to and that a means may be found to rehabilitate these services which are so necessary to our national defense and commerce. It is significant that at the present time the average age of vessels of over 2,000 gross register tons in the intercoastal and coastwise fleets is over 20 years.

"Little advance is shown in operations and new construction on the Great Lakes but river freight services are constantly expanding.

"In the other great division of our merchant marine, that employed in foreign services, much has been accomplished. Tanker owners have built and are building modern efficient tonnage in considerable volume without Government assistance and have cooperated with the Government in building also a class of large tankers in which the Government has paid only those amounts occasioned by the inclusion of special national defense features, most important of which is increased speed. Various private owners have availed themselves of the assistance provided in the Merchant Marine Act 1936 to contract for tonnage of a superior type ranging from the largest passenger vessel yet constructed in the United States to combination passenger and freight vessels and efficient and modern cargo liners. The Maritime Commission has itself contracted for many vessels direct, with a considerable additional number now under consideration and has already succeeded in placing a number of them in private hands for operation.

"Much has been accomplished but much remains to be done. If the American Merchant Marine is to be placed in a position where a reasonable percentage of American exports and imports can be carried in American Flag vessels the present activities must be continued for many years.

"Attention must be paid to the situation created by the increasingly nationalistic attitudes of other maritime nations and the measures they are taking to further the interests of their own merchant marines."

Let's Speed Up Our Merchant Navy

The present shipbuilding program of the Maritime Commission is 50 ships a year for 10 years. This program was based primarily on the minimum needs of the Army and Navy in an emergency and secondarily on an orderly replacement program for the American Merchant Marine.

We have now entered the third year of the decade involved in this program. So far contracts for sixty-six vessels in this program have been issued to American shipyards and a tentative commitment made for four more. Only 16 of these vessels have been launched. In the meantime the U. S. Navy is building more and bigger battleships, cruisers, airplane carriers, destroyers, submarine and auxiliary vessels with the greatest peace-time naval budget in history.

Even on its "minimum naval needs" program the Maritime Commission will have to speed up to about 75 ships a year for the next six years if the program is to be finished in the allotted ten years.

Since the law specifically estops the shipbuilder from making more than a ten per cent profit on his actual out-of-pocket costs as determined by the Commission, we suggest that the obvious way to speed up the program is to allot contracts on a basis of best guarantees of delivery dates.

Let's Catch Up With The Modern Fleets Before 1950

A Calendar *of* Marine News in Brief

July 20 Charter for the Port of San Francisco, Propeller Club of the United States, was presented to president Tirey L. Ford, president of the newly-formed unit of the national organization.

21 Isthmian Line inaugurated its long-planned Westbound Gulf-Pacific general cargo service with the departure from Mobile of the steamer Henry S. Grove.

22 A plan for reorganization of the American Mail Line and resumption of its services from Puget Sound to the Orient was filed in the Federal court at Seattle.

23 Report of directors of the Suez Canal showed that 6,171 ships passed through in 1938, with an aggregate tonnage of 34,418,000. British flag shipping accounted for 50.4 per cent of the tonnage.

24 First bargeload of bulk wheat to move out of the Port of Arlington (Oregon) down the Columbia River to Portland was handled by the Upper Columbia Towing Co.

25 Italian Government took over the three large Italian shipyards, two at Genoa and one at Triest. 200,000 tons annually for ten years was announced.

26 A Belgian decree requires millers and importers to maintain reserve stocks of foreign wheat aggregating over five million bushels.

27 International Longshoremen's and Warehousemen's Union demanded changes involving higher pay and shorter hours in their working agreement with the Waterfront Employers' Association of the Pacific Coast.

28 During this last week of July, 50 military and training planes for European governments were shipped from Los Angeles harbor on European flag vessels.

29 Grain exports at the Port of Vancouver, B. C., for the current crop rose to 41,434,736 bushels, as compared with 1,211,016 last year.

30 The U. S. Maritime Commission sustained the conferences covering the trade between North Pacific ports and Mexico, Central America and South America, in their refusal to grant membership to the Brodin Line.

31 An American sailor, Michael Ford, aged 22, jumped from the Brooklyn Bridge to the East River over 200 feet below, swam ashore, and walked into a saloon slightly dazed. Some sailor!

August 1 One hundred and fiftieth anniversary of the founding of the U. S. Customs Service.

2 California's sardine fishing season opened, but no sardine boats went out. The market for sardine by-products, oil and poultry feed was so low that packers had not even begun to negotiate a price with the fishermen.

3 At Astoria, Oregon, 20 purse seiners brought in 1300 tons of sardines, the largest day's catch on record for that port.

4 M. S. Mormachawk, second new motorship of the Moore-McCormack fleet, cleared from New York in Scantic Line service to Northern European ports.

5 President signed bill enabling U. S. Maritime Commission to accept vessels 17 years old and up from American shipowners in trade for new ships to be used in coastwise or intercoastal service.

6 The Port of Los Angeles (Port 66) of the Propeller Club of the United States was founded.

7 Began the nation-wide celebration of Lighthouse Week in honor of the 150th anniversary of the establishment of the Federal Lighthouse Service.

8 Kamakura Maru landed 60 Japanese college students to attend the annual conference of the Japan-American College Association at the University of Southern California, Los Angeles.

9 Waterfront Employers' Association refused to accept any upward revision of working agreement with International Longshoremen's and Warehousemen's Union; offered to renew existing agreement, which expires September 30.

10 Seattle reported that Maritime Commission has issued new contract to operating managers of Pacific Northwest Oriental Line. The former contracts were cancelled when the line was held up by union labor activities.

11 New lighthouse tender Walnut arrived at Detroit from San Francisco all well after 7,300-mile delivery voyage.

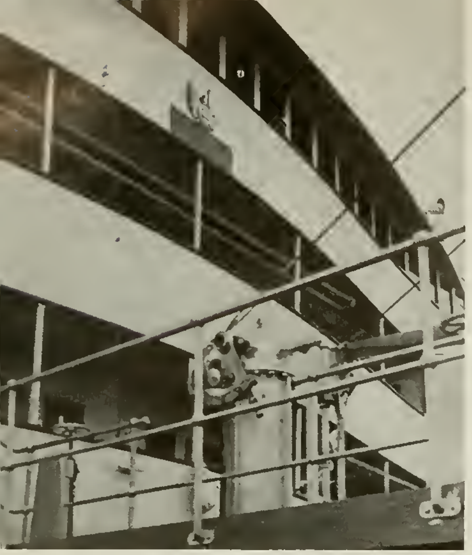
13 U. S. Coast and Geodetic Survey got $360,000 in the third Deficiency Bill, enabling it to keep the survey vessels busy during coming winter.

14 P. A. S. Franklin, retired chairman of the board, U. S. Lines, and recognized dean of American ship operators, died today, aged 68.

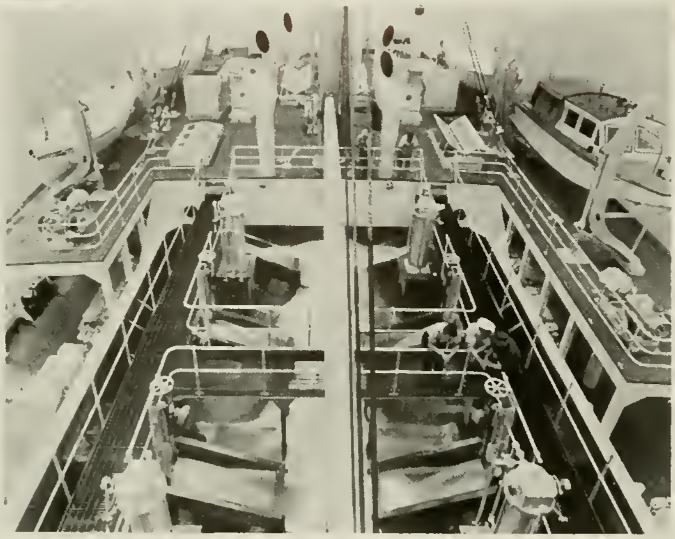
15 J. Curran, president, National Maritime Union, proposed single national collective bargaining committee representing all maritime unions.

16 Sailors' Union of the Pacific voted to seek reopening of steam schooner and offshore agreements this year. Radio operators took similar action.

17 Federal Maritime Labor Board offered its services as mediator in the contractural disputes between Pacific Coast Waterfront Employers and Union labor.



The Seagoing Dredge



Above: Bridge front with curved visor over. Eagle in polished white metal with gold-plated Engineer Department symbol on shield. Speaker may be seen on searchlight. Hydraulic hopper cylinder in foreground, with nozzle wheel to the left.

Right: After hoppers being loaded with mud through discharge from the dredge pumps at 200 r.p.m.

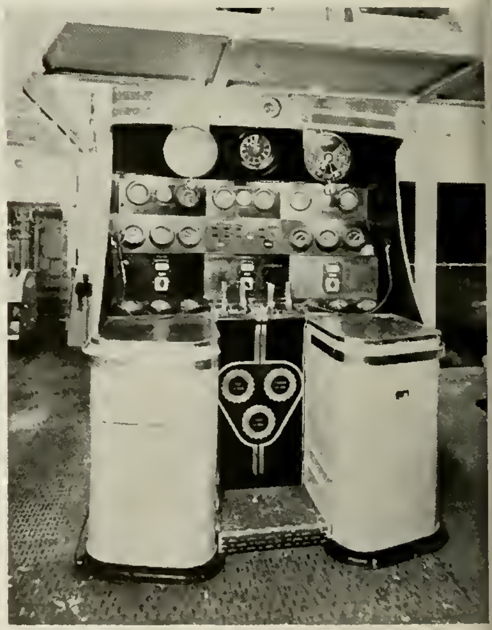
The newest and also the handsomest seagoing dredge to be built for the U. S. Army's Engineer Corps is the diesel powered Chester Harding, just completed by the Pusey and Jones Corporation of Wilmington, Delaware, as the seventeenth ship to be constructed for the War Department by that venerable firm since 1871. The new craft is named after the late Brigadier General Chester Harding, eminent Army engineer and administrator, who was Governor of the Panama Canal from 1917 to 1921. Noteworthy for its numerous distinctive features, this 2500 cubic yard capacity dredge combines the most recent practices in deep water dredging with the skill and experience of the country's oldest steel shipbuilder.

Dredging trials recently conducted on the Delaware River have attested the successful operation of diesel prime movers at low propeller speeds, which is a primary essential in cutting channels by means of the suction drags with which the ship is equipped. The dredge's twin rudders demonstrated maneuverability beyond expectations at all speeds, according to Edward A. Hodge, marine manager for the shipyard, under whose supervision the 7,000-ton craft was constructed. The vessel's seven diesel engines, as well as all of her other complicated machinery, functioned with equally gratifying results.

Chester Harding will be assigned initial service in New York Harbor, where she has yet to go through her thirty-day shakedown trials in the hands of her civilian Engineer Corps crew.

As shown in the table of characteristics, the dredge measures 308 feet in length and has an overall beam of seventy-three feet, outside of her projecting sponsons. Despite this high beam length ratio, however, she symbolizes what is hoped will become a modern trend toward the beautification of the so-called workboat. For this forward step, much credit is reflected upon the Pusey and Jones Corporation for design contributions that have so strikingly demonstrated how far the shipbuilder can go in attaining pleasing eye appeal with very little to work on as a ship type.

In this case utility was enhanced rather than sacrificed, as evidenced by the spacious full-vision bridge which is glass enclosed, overhanging the ship's sides and carried down beneath to offer the protection of a solid steel bulwark at the upper deck opposite the machinery space doors. Embellished by a polished white metal eagle, flanked by the ship's name in embossed gold letters, the bridge is strikingly set off as viewed from the fore part of the vessel. Stainless steel banding has been em-



Central diesel control station designed by the shipbuilder for operating main engines and recording three other diesels.

Chester Harding

Pusey and Jones Deliver Diesel Hopper to the United States Army Engineers. . . . One of 1939's most Distinctive Ships

ployed by the builder to set off the U. S. Engineer Corps' stack insignia, which is made of the same maerial, surmounted by a streamlined hood bordered with polished split pipe to effect harmony with the bridge design and finish.

Modern, fireproof construction marks the steel-joiner work of the crew and officers' quarters, which are finished in cream color, with steel furniture, photographically grained to imitate mahogany. The outside doors and windows are of solid mahogany fitted with bronze hardware; the decks covered with inoleum, wax finished.

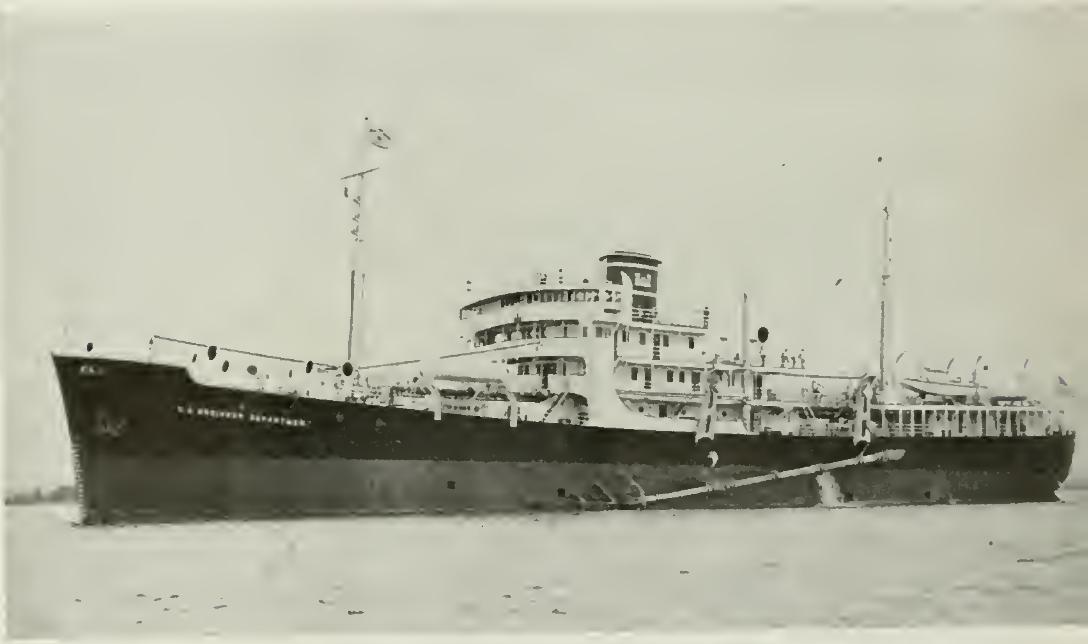
The builder has taken particular pains in providing electric illumination which is devoid of eye-glare through the use of inconspicuous deckhead fixtures that give the effect of indirect lighting but at the same time offer direct downward rays for reading. The rooms throughout are spacious and a decided advance in crew comfort for workboats of this classification.

Stainless steel has been liberally used in outfitting the galley and mess rooms, being employed even for mess table tops in the interest of maximum sanitation. All chairs throughout the vessel are of polished aluminum, fitted with upholstered seats. The plumbing fixtures have been well chosen and care has been taken to assure hot water under all conditions of the ship's operation through heat transfer from the galley range, diesel generator exhausts and electric heater elements in the supply tank.

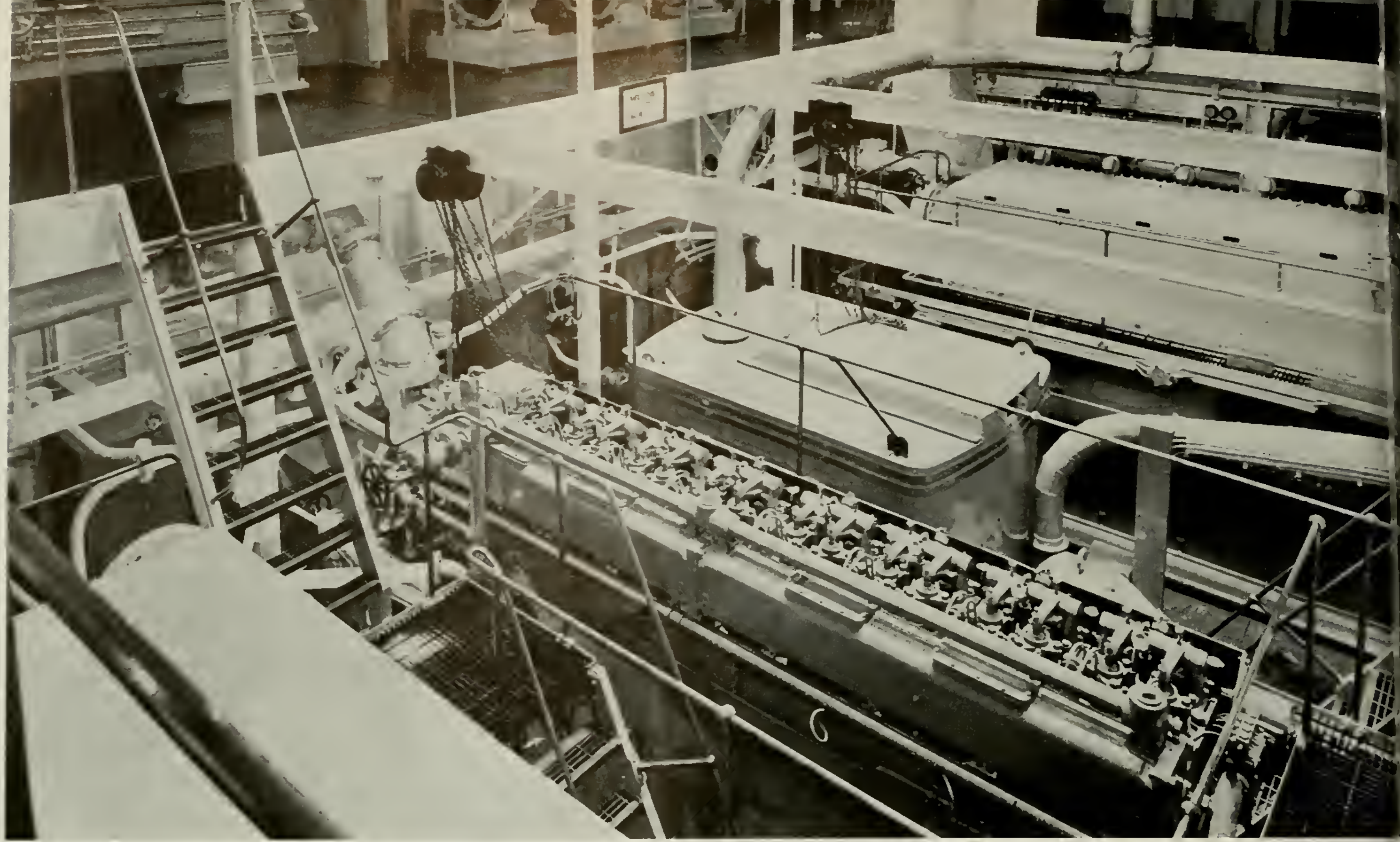
Mud Hoppers

The dredge is of the two-compartment type, having a pair of hoppers forward and aft of the superstructure, with a total of eight dumping doors, or gates, in the ship's bottom, arranged in pairs outboard of the ship's centerline. These doors are opened and closed by pistons actuated by a hydraulic pressure of 300 lbs. in cylinders located over the hopper coamings on the bridge deck level. The pistons are connected to the doors by 6 inch double extra heavy seamless steel tubes with clevis pin couplings. Each cylinder is separately controlled by a hand cock operated at the cat-walk level. A manual locking lever on the top of the cylinder avoids dependence upon pressure maintenance wherewith to keep the doors in either an open or closed position. A fifty-horsepower electrically driven pump is employed to maintain tank pressures up to 400 lbs. per square inch for the door operation. Return connections from the several cylinders are led to a common sump tank. Each hopper door is bordered on the inside with heavy rubber strips having free edges so that weight of the dredged material will make the doors self-sealing.

There are two eighty-five foot drag pipes, one on each side of the ship, which penetrate the hull abreast the pump room. Each of these is connected into the suction side of one of the 22-inch pumps in the pump room. The pump discharges consist of flanged steel pipe risers which extend vertically up from the pumps to the under side of the boat deck, where they terminate in control valves of the "Y" type. Thence, on each side of the ship, the discharge pipes are extended fore and aft alongside the hopper coamings and are arranged to discharge material through sixteen manually controlled nozzles under



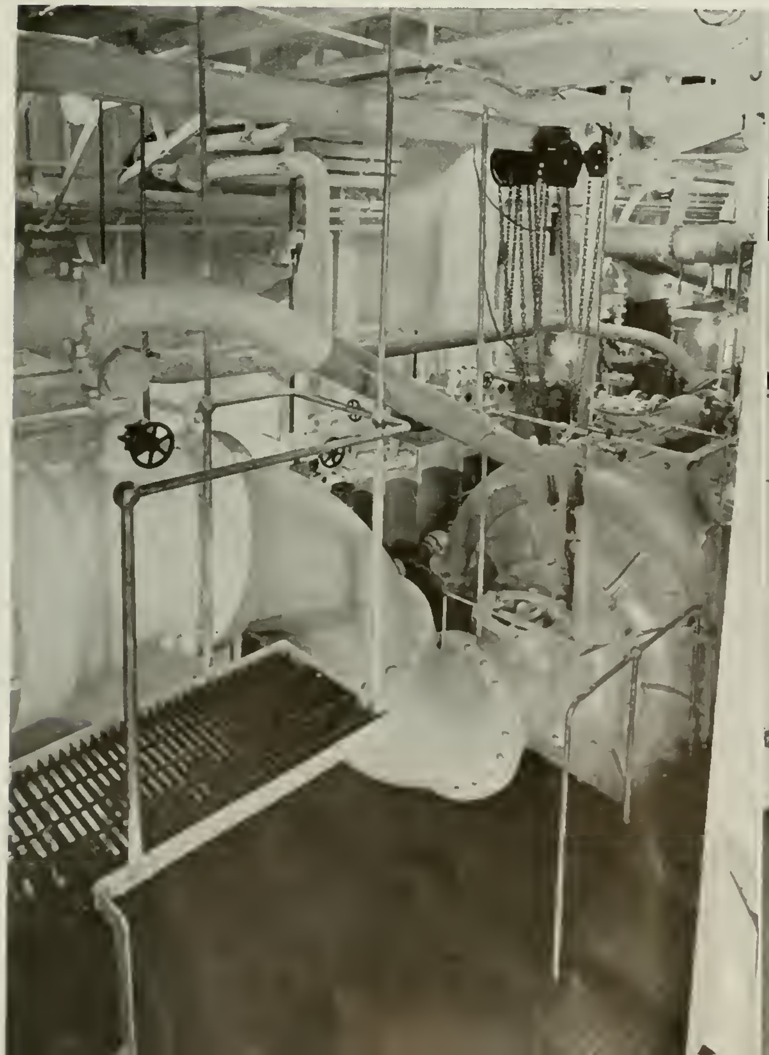
U. S. Engineer Department seagoing dredge Chester Harding; 2500 cubic yards capacity.

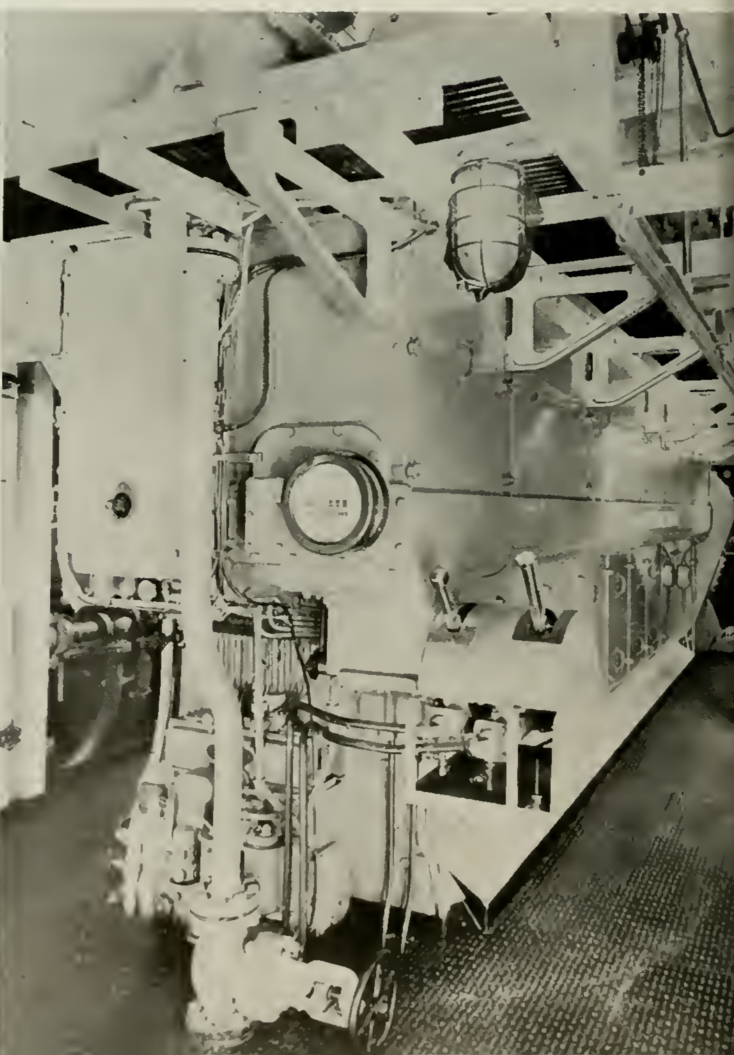


Above: Engine room, showing both main engines, generator engine, stand-by generator engine in sound-proofed enclosure, machine shop flat with motor generator set for the control of the drag pipe winches.

Below, left: Starboard cast steel 22″ dredge pump.

Below, right: Streamlined starboard main engine, built by Busch-Sulzer Bros. Diesel Engine Co. to develop 1,000 S.H.P. (Total S.H.P. 2,000.)





PRINCIPAL CHARACTERISTICS

Length overall	308′-2″
Length, load water line	300′-0″
Hull breadth molded	56′-0″
Breadth over sponsons	73′-0″
Depth molded	29′-0″
Draft loaded	20′-2″
Draft light	11′-5″
Displacement loaded (tons)	7523
Displacement light (tons)	3505
S. H. P. (total)	2000
Speed light (knots)	10.79

which steel troughs convey the material to a flat cement-covered distribution plate along the ship's center line over the hoppers. The "Y" valves are mechanically controlled from the bridge so that a proper longitudinal trim may be maintained at all times. Sixteen manually operated gates in the chutes are arranged to facilitate transverse trim by diverting the material flow to the port or starboard side of the hoppers as desired. Eight sliding steel gates, two feet high and about nineteen feet long, are arranged along the top of the hopper coamings so that they may be raised or lowered pneumatically to divert the water overflow or augment the hopper capacity by increasing the height of the hopper sides, as needs may demand.

Dredge Pumps

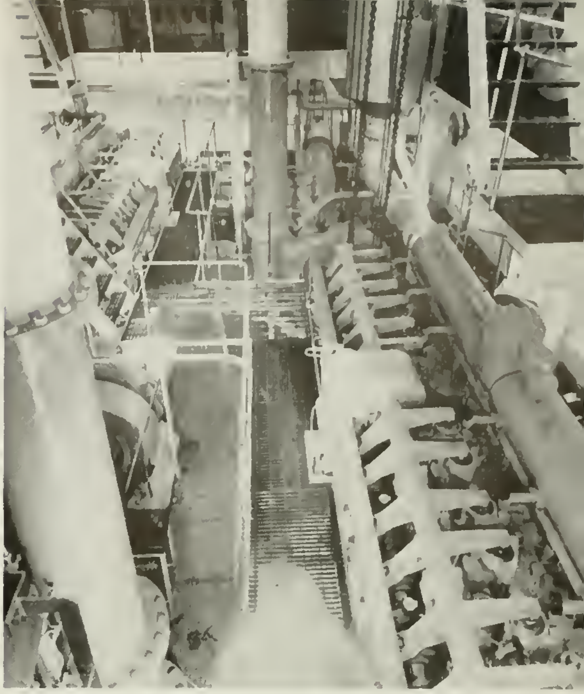
The pump room is separated from the engine room by a watertight bulkhead and contains the two diesel engines which drive the dredge pumps. The engines are of the four-cycle, non-reversing, 650 B. H. P. six cylinder, solid injection type, made by the Cooper-Bessemer Corporation and designed to operate between 180 and 230 revolutions per minute. Also in the pump room are: the engine auxiliaries; the pumps and 700 lbs. pressure tank for the watertight door system; and the ship's 15 lbs. steam heating boiler and utility pumps.

Propulsion Plant

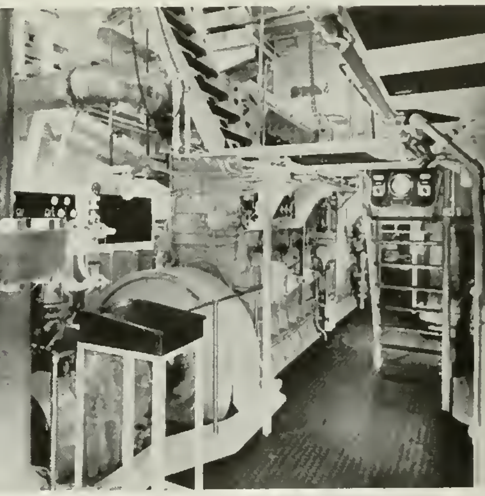
In the engine room there are two Busch-Sulzer 1000 S. H. P., eight cylinder, four-cycle, solid injection, direct reversing diesel propelling engines, directly coupled to the propeller shafts through Kingsbury thrust bearings. These engines turn four-bladed cast steel propellers at 230 revolutions per minute when the ship is making her maximum speed of 10.79 knots.

Both of these engines are remotely controlled from a central station in the engine room in which are concentrated the gages, tachometers, alarms and pyrometers of both engines as well as those of the main generator and stand-by generator engines. As the accompanying photograph shows, the control station has been compactly developed by the shipbuilder so that all panels are in a plane perpendicular to the operator's line of vision. Indirect illumination precludes eye glare from the faces of the several instruments. Built-in inter-communication systems include, beside the marine telegraphs, a sound-powered telephone, speaking tube and the more modern talkback loud speaker, which is positioned directly behind the clock. Low-pressure and high-temperature alarm indicators are in the center of the main panel. They are so connected as to give these warning signals from the two pump engines in addition to the four diesels in the engine room. The station has been designed for handsome appearance without sacrifice in utility, being accessible at the back through double doors. The port and starboard air mains are controlled by valves visible in the photograph just under the main engine control levers. The six air main gages are on the lower set of panels, just above the twin log desks, which are an integral part of the station.

All of the five large diesel engines start on an air pressure of 250 lbs. per square inch. Two 20-H.P. electrically driven 42 cubic foot Ingersoll-Rand compressors supply air at 350 lbs. pressure to the four air tanks abreast the after hoppers. An emergency 350-lbs. air connection is provided for introducing pressure to the hopper system's hydraulic tank; and service air at 100 lbs. pressure serves the machinery spaces and pneumatic hopper side gates.



- Pump room, showing the two Cooper-Bessemer 650 B.H.P. diesel engines which operate the dredge pumps; positioned with centerlines 'thwartship.



- Pump room as viewed between the engines.

Each of these five engines exhaust into the common stack and each exhaust is fitted with a Vortex silencer.

For the same five engines there is a common closed cooling water system, supplied with fresh water from double bottom tanks under the engine room. Three centrifugal 400 g. p. m. pumps driven by 10-H.P. electric motors are selectively arranged

(Page 29, please)

C-1 Vessels of The U. S. Maritime Commission

A General Description of the Salient Design Features and some Comment Thereon

Four designs have been issued by the U.S. Maritime Commission under the general designation C-1. These four are specifically stamped:

C-1 AD, a shelter deck type of hull driven by diesel engines;

C-1 AT, a shelter deck type of hull driven by steam turbines;

C-1 BD, a full scantling type of hull driven by diesel engines; and

C-1 BT, a full scantling type of hull driven by steam turbines.

Common Features

In the main, the general description of these hulls is the same for all four types and we will here set down the features that are common to all of them.

The hulls are of steel with single screw, cruiser stern and raked stem. Two complete steel decks are fitted all fore and aft. A third deck below the second deck is fitted forward of the machinery space. Aft of the machinery space a flat is carried across the holds at the level of the top of the shaft tunnel.

The forward end of the deck house is exactly amidships and the forward machinery space bulkhead is seven frames aft of amidships.

Accommodations for passengers, officers and crew are all in the deckhouse amidships. As will be noted in the general arrangements plans reproduced herewith, this deckhouse has two deck levels above the weather deck and surrounds the machinery casing.

On the second deck level in way of machinery casing are located: on the starboard side the galley, crew's mess and lounge, a pantry, petty officers' mess and lounge, and stores; and on the port side a room for CO_2 bottles for fire extinguishing system, the refrigerated stores, the hospital and the laundry.

At the weather deck level are located accommodations for the seamen, oilers, wipers, boatswain, carpenter, electrician, steward, messmen, cadets, first assistant engineer, second assistant engineer, third assistant engineer, junior third assistant engineer, and the ship's office.

The boat deck is fitted with accommodations for the chief engineer, the deck officers, the radio operator and eight passengers. A commodious dining room and lounge is installed amidships at the forward end of this deck, flanked by two staterooms on each side Each of these four rooms houses two passengers and each room has a private shower and toilet. The dining room has a large pantry adjoining. A room on this deck is assigned for the emergency generator and control station. There are two lifeboats hung on davits served by electric winches. Each of these boats has a capacity to take 59 persons. In other words, 10 more than entire number of persons normally on board can be accommodated in each boat.

On the bridge deck are the captain's accommodations, the wheel house, the chart room, the radio room, a spare stateroom with shower and toilet, and a fan room.

The boatswains stores are located forward of the forward collision bulkhead, and the carpenter shop and paint room aft of the after peak bulkhead.

There are seven watertight bulkheads dividing the ship into eight spaces from forward aft, as follows: the fore peak, No. 1 hold, No. 2 hold, No. 3 hold, machinery space, No. 4 hold, No. 5 hold, and the after peak.

Hatches for Nos. 1, 2 and 3 holds forward are served by 9 booms on two pairs of king posts and by 8 electric cargo winches. The beam across the tops of the forward pair of king posts carries at its center a pole mast from which the radio antenna runs aft to a similar mast on the pair of king posts aft which serve the hatches for Nos. 4 and 5 holds. At these after king posts there are four booms and four electric cargo winches.

The pole masts are demountable and the king posts are designed to pass under the bridges of the Manchester ship canal with these poles lowered when the hulls are down to a draft of 19 feet.

Twelve of the cargo booms are of 5 tons working capacity. One heavy lift boom on the after side of the forward king posts and serving hatch No. 2 is of 50 tons capacity, and another on the after side of the after king posts and serving hatch No. 5 is of 25 tons capacity.

All booms are to be of sufficient length so that when topped to an angle of 45 deg. they will have an outreach of 18 feet over the side of the ship.

In addition to the deck hatches on all types of C-1 hulls side ports are provided in way of the upper tween decks in holds No. 2, No. 3 and No. 4.

All of the weather deck hatch covers are to be of the "Tutin" type, which eliminates the use of strong backs and wood covers and stows at the end of hatch combing, leaving the deck clear for cargo handling.

A forced system of ventilation is to be installed for all cargo spaces, and rooms are provided in the upper tween deck spaces for installation of electric blowers for this purpose. In this connection the Maritime Commission states that it "has in mind a system of hold ventilation recently introduced, called 'Cargocaire,' and earnestly invites the attention of shipowners to this important question."

A complete smoke detection and CO_2 fire smothering system will cover all cargo spaces.

The mooring equipment and fittings have been arranged to suit requirements of canal authorities. The electric windlass forward has two attached warping gypsey heads, and there are two electric capstans aft. Bitts, chocks and fair leaders are installed in sizes and locations to meet all warping and mooring requirements.

Full radio equipment of the most modern type will be installed, including radio direction finder. A master gyro compass and several repeaters, a gyro helmsman, a Fathometer and searchlights will be included in navigation equipment.

All furniture, all joiner work, all partitions in crew's and passengers' accommodations will be of incombustible materials. In the design especial attention has been given to provide adequate lighting and ventilation. Steam heating is provided in all quarters.

The galley is a modern, all-electric kitchen trimmed in stainless steel and fitted with sanitary tile flooring.

So far this description has covered those features that are the same on all four C-1 designs. We will now look at the differences.

Hull Differences

In the shelter deck type of hull the bulkheads between cargo holds are made watertight only up to the second deck, while in the full scantling type these bulkheads are of watertight construction up to the weather deck. Since the deck which tops the watertight bulkheads is the freeboard deck, for classification and load line purposes it is evident that the full scantling type can be loaded deeper and hence carry a heavier deadweight cargo than the shelter deck type.

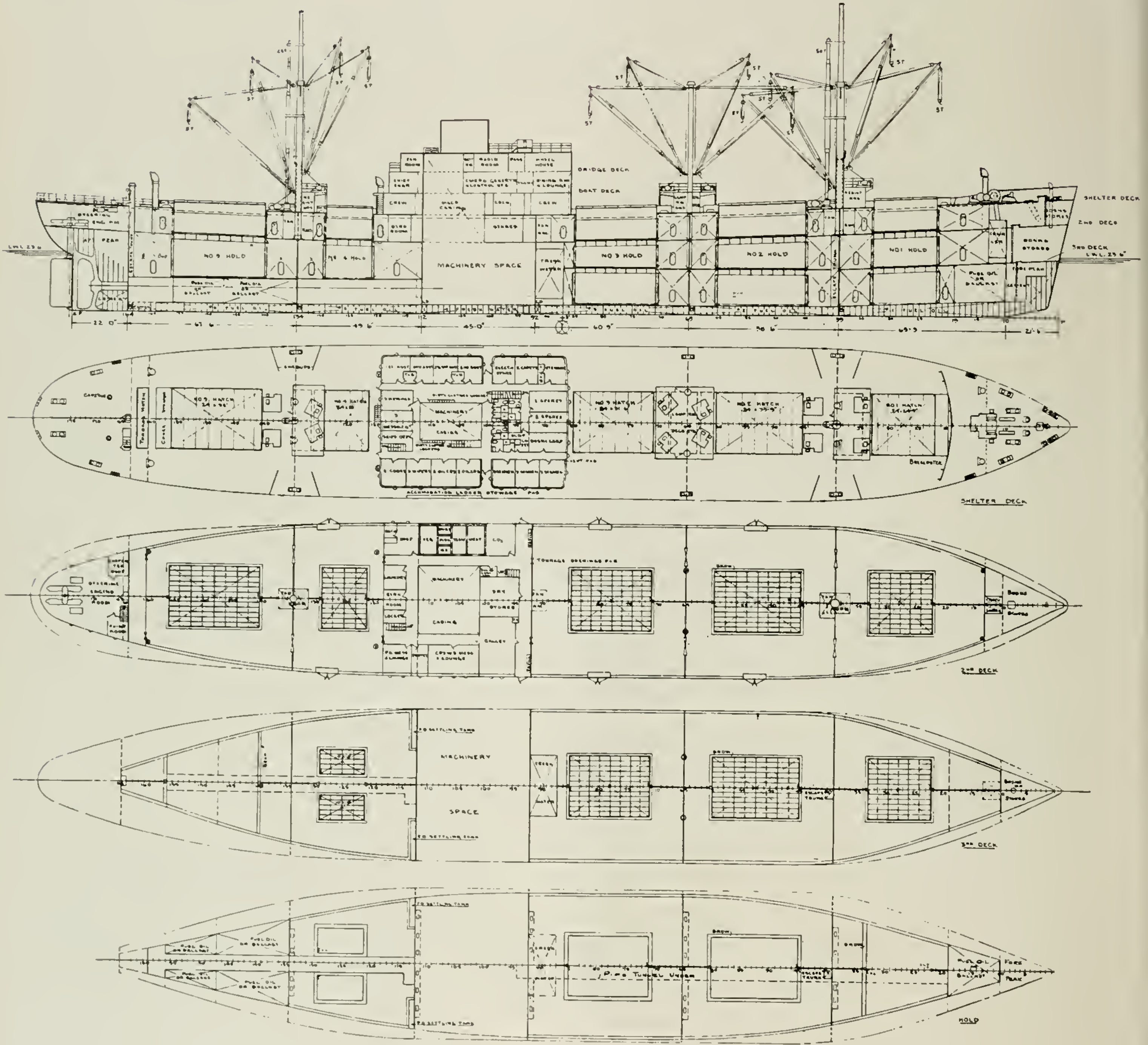
General Characteristics of C-1 Designs

CHARACTERISTICS	Shelter D'k Turbine	Shelter D'k Diesel	Full Sc't'g Turbine	Full Sc't'g Diesel
Length Overall (approx.)	413′-0″	413′-0″	416′-0″	416′-0″
Length Between Perp's	390′-0″	390′-0″	395′-0″	395′-0″
Beam Molded	60′-0″	60′-0″	60′-0″	60′-0″
Depth Molded Shelter Deck	37′-6″	37′-6″	37′-6″	37′-6″
Draft Molded Loaded	23′-6″	23′-6″	27′-6″	27′-6″
Deck Height, 2nd to Shelter	9′-3″	9′-3″	9′-6″	9′-6″
Deck Height, 3d to 2nd	10′-0″	10′-0″	10′-6″	10′-6″
Sea Speed at L'd Draft	14 Knots	14 Knots	14 Knots	14 Knots
Shaft H.P. Normal	4000	4000	4000	4000
Normal Crew	43	41	43	41
Passenger Capacity	8	8	8	8
Gross Measurement	5028-T.	5028-T.	6750-T.	6750-T.
Net Measurement	2820-T.	2820-T.	4800-T.	4800-T.
Weights: Hull Steel	2180-T.	2180-T.	2365-T.	2365-T.
Outfit	768-T.	768-T.	767-T.	767-T.
Engineering	500-T.	600-T.	500-T.	600-T.
Margin	152-T.	152-T.	168-T.	168-T.
Total Built Weight	3600-T.	3700-T.	3800-T.	3900-T.
Fuel Oil	889-T.	653-T.	889-T.	653-T.
Crew and Stores	35-T.	35-T.	35-T.	35-T.
Fresh Water	336-T.	272-T.	336-T.	272-T.
Deadweight Cargo Capacity	6240-T.	6440-T.	7815-T.	8015-T.
Loaded Displacement	11100-T.	11100-T.	12875-T.	12875-T.
Bale Cubic Capacity	451288-Ft.	449928-Ft.	450146-Ft.	448786-Ft.

Figures for this table are taken from the "General Description of C-1 Designs," issued by the U. S. Maritime Commission. The figure for fuel weights carried is based on 10,000 nautical mile crusing radius and contemplates using about ½ of the fuel capacity in the case of the diesel ships and a little over 60 per cent in the case of the turbine ships. In the case of the full scantling type hull with diesel drive the figures issued by the Commission contemplated fuel and water for 12,000 miles. We have taken the liberty of reducing these weights to those necessary for the 10,000-mile range so as to give a comparison on a more equable basis. Using the total fuel oil tank capacity fitted, the turbine drive ships would have a cruising radius of approximately 16,000 miles and the diesel drive ships approximately 21,000 miles, both at 14 knots speed.

C-1 SHELTER DECK TYPE DESIGN

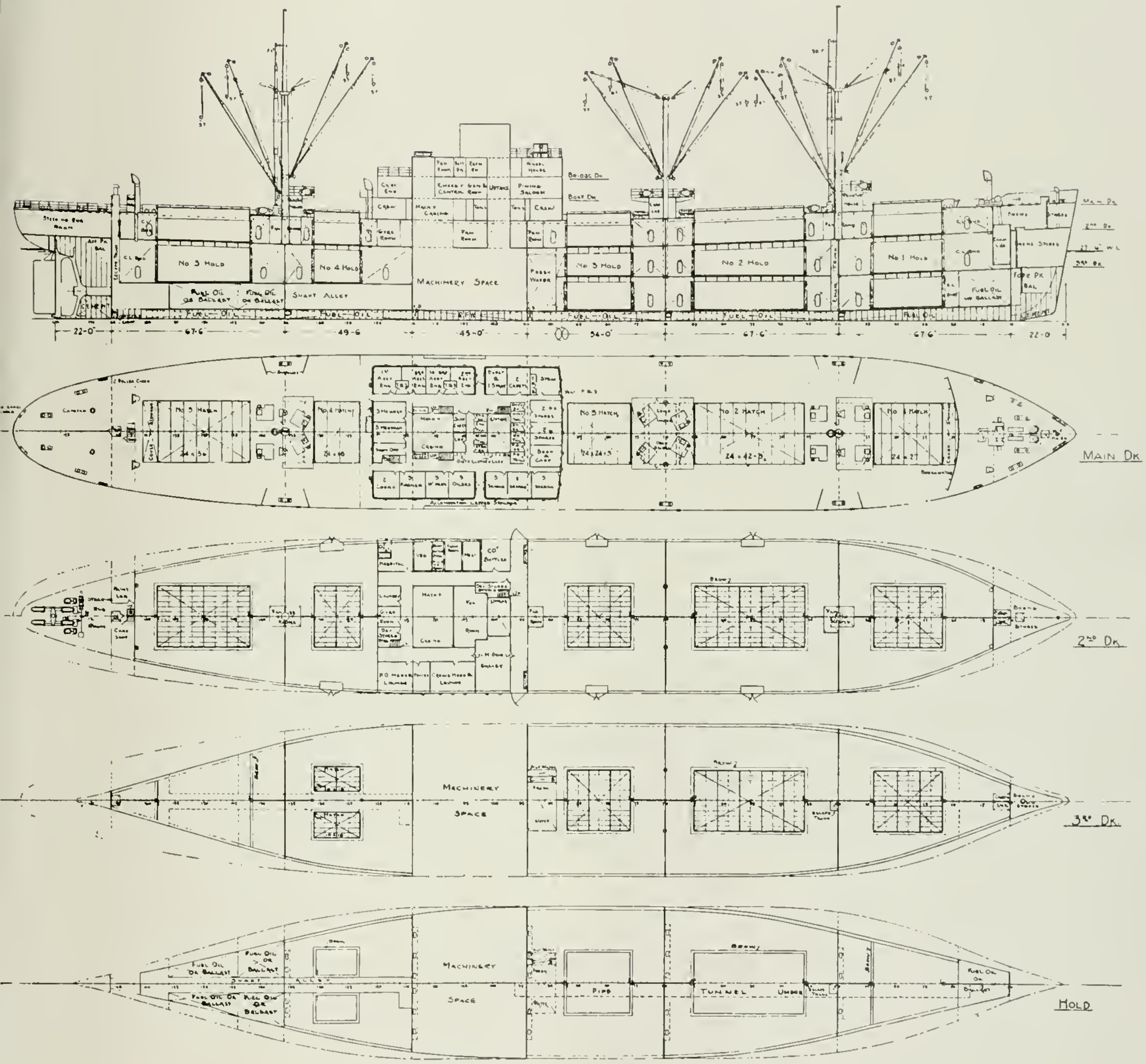
Inboard Profile and General Arrangement Plans



This type is designed for routes having a large proportion of volume cargo and package goods. It gives a large cubic capacity on a low net measurement tonnage.

C-1 FULL SCANTLING TYPE DESIGN

Inboard Profile and General Arrangement Plans



The full scantling design deeper draft and consequently a greater deadweight carrying capacity. Since the bulkheads in this type must be watertight to the weather deck, no tonnage openings are allowed in the upper 'tween decks and so the net measurement is comparatively large.

The hull of the full scantling type must therefore be made stronger than that for the shelter deck type, and the table of comparative characteristics herewith shows the additional weight of steel built into the hull for strength purposes. It will be noted that for a total of 200 tons additional weight built into the hull there is a gain of 1540 tons cargo deadweight capacity in the case of the turbine drive ships and of 1575 tons in the case of the diesel drive ships. This full scantling type will therefore be of great advantage to those operators handling mostly weight and not volume tonnage.

It will be noted also that there is a very marked increase in net measurement tonnage in the full scantling type. This increase, approximating 2000 tons, becomes a very important factor in the operating expense of a ship, particularly in those routes transiting canals and calling at many harbors. Most charges against the ship are based on net measurement.

Another advantage of the full scantling type as designed by the U.S. Maritime Commission is a large hatch forward. The following table shows the comparative sizes:

Size of Hatches

Hold	*Shelter Deck*	*Full Scantling*
1	24′ 0″ x 24′ 9″	24′ 0″ x 27′ 0″
2	24′ 0″ x 33′ 9″	24′ 0″ x 42′ 9″
3	24′ 0″ x 31′ 6″	24′ 0″ x 24′ 9″
4	24′ 0″ x 18′ 0″	24′ 0″ x 18′ 0″
5	24′ 0″ x 36′ 0″	24′ 0″ x 36′ 0″

This long opening in No. 2 hold will be of great benefit in the economic handling of some cargoes.

The spacing of bulkheads governing the fore and aft length of holds is decidedly different in the two types. Lengths of each hold in each type is as follows:

Hold	*Shelter Deck*	*Full Scantling*
1	65′ 3″	67′ 6″
2	58′ 6″	67′ 6″
3	60′ 9″	54′ 0″
4	49′ 6″	49′ 6″
5	67′ 6″	67′ 6″

Diesel Power Plant

The specifications for the diesel drive for the C-1 ships call for two directly reversible diesel engines each connected through hydraulic or electro-magnetic slip couplings to one of the pinions of a single reduction gear set, the slow speed gear of which is directly connected to the propeller shaft.

These engines must deliver a total of 4000 shaft horsepower on the propeller shaft when that shaft is turning 90 revolutions per minute and the engines are running at their normal rated speed. They must be capable of maintaining operation under a continuous overload of 10 per cent and of maintaining operation for 2 hours at 25 per cent overload.

This propulsion unit will be controlled from a single operating station. The controls will be so arranged that both engines or either of them can be started, stopped or maneuvered, and both couplings or either of them connected or disconnected from the single station.

Electrical load will be carried by diesel driven generating sets of adequate capacity.

Exhausts of both main and auxiliary engines are used in a waste heat boiler to provide steam for heating quarters, heating fuel oil, and other purposes.

Estimates based on data from towing models of this hull show that with moderate fouling of bottom and adverse weather conditions a loaded sea speed of 14 knots can be maintained with 3750 shaft horsepower. Since the plant can deliver 4400 shaft horsepower continuously, or 17 per cent more than necessary to maintain sea speed, there should be no difficulty in keeping schedules with these cargo liners.

It is announced that the consumption of fuel based on the use of 3750 S.H.P. and on oil of 19 A.P.I. gravity will be 118 barrels a day. This works out at approximately 0.4 lbs. of oil per shaft horsepower hour for all purposes and is attainable on a continuous operation basis with a modern diesel engine plant.

Steam Turbine Drive

In the turbine jobs steam will be generated by two modern marine type water tube boilers with a gage pressure of 450 pounds per square inch and a temperature of 750 deg. F. These boilers will be installed in the machinery space forward of the propulsion unit. They will burn oil under forced draft and will deliver steam to a cross compound, high speed modern marine type turbine. Double reduction gearing of the most efficient type will connect the turbine rotor shafts to the propeller shaft and deliver thereto 4000 shaft horsepower at 90 revolutions per minute.

These turbines must be capable of maintaining operation under a continuous overload of 10 per cent, and must be capable of operating at 25 per cent overload for 2 hours.

Most auxiliaries are electric and the electric light and power load will be handled by steam turbine generating sets.

It is stated that the consumption of fuel based on 3750 shaft horsepower and oil of 15 A.P.I. gravity will be 166 barrels a day. This figuse seems to work out at 0.628 lbs. per shaft horsepower hour for all purposes.

Stainless Clad Steel

Stainless clad steel sheets and plates, known as Silver-Ply, which combine the corrosion resistance of stainless steel with many of the desirable properties of mild steel, are now being marketed by the Jessop Steel Co. They are suitable for cooking vessels, storage tanks and other equipment used in the processing and handling of varnish, chemicals, soaps, oil and gas, textiles, paper, pharmaceuticals, food, and in marine equipment, water works, and sewage disposal plants, etc., wherever corrosion or erosion are encountered. A typical vessel fabricated from Silver-Ply is shown in the upper part of the illustration.

Silver-Ply may be bent, spun into deep heads, deep drawn, drilled and otherwise worked with greater ease than solid stainless. Furthermore, it has better heat conductivity than solid stainless and is not subject to "hot spots"—an important advantage when used in the fabrication of cooking vessels.

Silver-Ply is manufactured by a patented process which assures a strong, uniform, oxide-free weld between the stainless cladding and the mild steel backing.

The usual sheet or plate of Silver-Ply consists of 20 per cent stainless steel and the balance mild steel, ordinarily of Flange quality; however, all degrees of cladding from 3 to 50 per cent have been successfully produced. Complete information and copy of specifications will be sent upon request.

The Chester Harding

(Continued from page 23)

for fresh water circulation through coolers located on the machinery flat, which have a heat transfer capacity of 5,550,000 B. T. U. per hour. Raw water is circulated by two 20-H.P., 1200 g. p. m. electric pumps provided specifically for this purpose with cut-in connections so that either of the 50 H.P. fire-and-bilge pumps may be used for emergency stand-by.

Common transfer media make possible equal flexibility in the application of lubricating oil to the diesel engines, with the usual purifiers, sumps and cleaned oil tanks. Three 7½-H.P., 100 g. p. m. lubricating oil pumps are available for main engine service, the other diesels in the ship having attached pumps for this purpose. The fuel oil is carried in the engine room double bottom tanks and provision is made for its purification by means of two purifiers. Lubricating oil transfer is accomplished by a 1½-H.P. pump; fuel oil transfer, by a 5-H.P. pump.

Electric Auxiliaries

At sea, and while dredging, electric power is derived from a 400-KW, 250-volt direct current Westinghouse generator cooled by induced ventilation and driven by an 8-cylinder, four-cycle, 450 r. p. m. mechanical injection, non-reversing type Cooper-Bessemer diesel engine. For stand-by service, 75 KW and 15 KW Buda diesel sets supply current; the former for ship's power and light; the latter for emergency use. An Exide storage battery supports the emergency generating set.

The power supply to all ship's machinery is at 240 volts, fed through a four-panel, dead-front, I-T-E Company switchboard located at the forward end of the engine room. All circuit breakers are of the latest type capable of removal from the front of the board. Three of the four panels control separately the 400-KW generator, 75-KW generator and the two 5-KW, 120-volt balancer sets employed for lighting current. The fourth panel is used for the auxiliary circuit breakers.

An emergency switchboard of the same make and construction, located within the upper deck machinery enclosure, provides for lighting circuit distribution and specialty devices; such as gyro compass, radio telegraph, searchlights, draft indicator, Fathometer, engine alarm systems, bulkhead door alarms, loud speaker system and battery charging, as well as an air compressor feeder and current supply to the navigating lights.

The ship's lead and armored electric cable was specially manufactured to order to withstand heavy usage, and the electrical installation in other respects also conforms to the rigid high standard of the Army Engineer Corps.

Of primary importance are the two drag pipe winches and the 150-KW motor generator set through which regulation of field current intensity and flow allows the remote control of each winch motor separately from within the drag tender's house immediately under each bridge wing, port and starboard. The winches have a set of tandem drums on a common shaft, driven through worm gears by an 85-horsepower, 250-volt, direct current electric motor. Both winches are located on the upper deck inside the 'midship house.

The drag pipes are raised and lowered on a two point suspension by steel cables run through blocks that are secured to heavy fabricated steel davits in such a way as to effect a balanced lift through a correct ratio of drum diameter to the angle of rise at the lift points on the drag pipe. An electrically powered, remotely controlled 20-H.P. screw mechanism attached to the after davits permits the drag tender to breast the davit on his drag pipe in or out at will, the length of davit head travel being about four feet.

The entire electrical equipment for handling the drag pipes and their breasting out gear is of paramount importance on a seagoing dredge because pay load efficiency depends so largely upon the skill of drag tenders in their ability to keep the drags high enough from channel bottoms to preclude clogging the pump suctions and yet low enough to make sure of picking up ample material without too much water, which accounts for the elaborate provision made in this equipment for vernier control.

All other deck machinery is electrically powered and includes four cargo winches, six boat winches, a 40-H.P. anchor windlass and a hydro-electric steering gear. The foremast and mainmast are rigged with derricks for handling dredging gear in and about the hoppers, as well as ship's stores. The winch motors for this service are rated at 25 H.P. King posts, abreast the 'midship house, are designed for lifting the heavy pump machinery and drag parts, to facilitate which trolley beams over the pump room are extended out beyond the house sides. These winches have 12½-H.P. electric motors. Mechanical davits of the latest type are employed for boat handling. There are four metal lifeboats, one workboat and a power launch chocked in way of the davits.

Toward the furtherance of safety at sea, a Stone watertight door system, made by the American Locomotive Company, provides for the hydraulic and manual closing of five watertight doors in main divisional bulkheads of the ship. Through gears, the doors may be opened from the upper decks by hand as well as by the inter-connecting hydraulic control system centralized in the wheelhouse and operating on 700 pounds per square inch pressure. Individual valves are provided at each door for local operation, all doors being protected by mechanical and electrical alarm bells. Two 7½-H.P. reciprocating pumps maintain full pressure at all times on a fluid tank at the forward pump room bulkhead.

Considerable thought has been applied to the design of the bridge and its elaborate navigating and control equipment. The primary objective in its conception has been to provide unobstructed vision. Toward this end it has been entirely glass enclosed, certain of the windows being of the fixed type and the balance being mechanically operated.

The natural "dead spot" created by the stack has been taken advantage of in the dual allocation of

(Page 46, please)

Captain Leland E. Hawkins at Wheel

Tanker Associated

Saves a Shipload of Souls--- Saves Many Barrels of Fue

The tanker Associated of the Associated Division of the Tide Water Associated Oil Company, on her arrival at San Francisco after her last round voyage to Manila, was given greatly deserved publicity as a rescue ship. The following press release from her owners tells the story leading up to this demonstration:

"When the Tide Water Associated Oil Company tanker S.S. Associated, commanded by Captain Leland E. Hawkins and carrying a crew of 38 men, left Manila on July 9, after discharging her cargo of gasoline, the ship headed for her home port of San Francisco on what seemed merely another routine run.

"Little did the men aboard suspect the part they were soon to play in one of the most thrilling and dramatic rescues at sea in the Pacific in recent marine history. Eight days out of Manila, on the morning of Monday, July 15, as Wireless Operator Hall went on duty he heard several Japanese ships excitedly talking among themselves. He could sense that some ship was having trouble, but for some time after making his first report to his captain he was unable to break in.

"With uncanny intuition Captain Hawkins altered the course of his vessel and headed for the position which had been given. Two hours later he dispatched a request for information as to whether his services were needed—if not, he would continue on his way.

"Immediately came the response urging him to hurry to the rescue of the Japanese ship Bokuyo Maru, which was on fire. At the time he was 60 miles away, blanketed by a dense fog. In the early hours of the afternoon he brought the Associated over the horizon to sight four drifting lifeboats, heavily laden with the 209 survivors of the ill-fated Bokuyo Maru, which had exploded and sunk since he had been urged to go to her rescue.

"All survivors were safely gathered aboard, sheltered, clothed and fed, with medical care given the i jured. The following day the rescued were transferred to anothe Japanese ship to be taken to Yokohama as Captain Hawkins, his errand of mercy completed, put hi ship again on course for San Francisco.

"In recognition of the dramati rescue, Captain Hawkins and hi crew were given a tremendous welcome in San Francisco upon thei return July 29, with numerous presentations made by the Japanese government through the San Francisc consul general; the Nippon Yuse Kaisha, from whose ship, the Bokuyo Maru, the rescue was made, an by civic officials of both San Francisco and Oakland.

"To all of this Captain Hawkins speaking for himself and crew, modestly repeated, 'We only did ou duty.'

"The arrival of the S.S. Associate was hailed by experienced marin men as extremely fortunate, for th lifeboats were so badly overloade with 209 men, women and childre that it was questioned whether i

Tanker Associated is a good, trim, shipshape craft with sweet lines and an able, economical power plant.

he fog-shrouded Pacific other ships vould have been successful in locatng the survivors at a later time. "The next nearest ship to the scene f the disaster was many hours furher away and it was only by aid f a powerful searchlight from the S.S. Associated and constant soundng of her whistle, that a rendezvous vas effected to bring about the ransfer. Only three casualties resulted, all before the arrival of the anker on the scene, and the saving of the survivors is hailed as a truly great accomplishment on the part of he senior captain of the Tide Water Associated Oil Company's tanker leet."

Picking up the survivors from the boats of the Bokuyo Maru.

The Associated is a new and ultra-modern steam tanker serving practically continuously in long round transpacific voyages. In these round trips she is making a very good showing in economical marine transport, and lest her performance in this respect be overlooked in the blare of this publicity for rescue work we record here some particulars of the vessel and her fuel consumption figures for this same round trip. Her principal characteristics are:

Length B.P.	442′ 0″
Beam molded	65′ 0″
Depth	35′ 0″
Summer draft	28′ 8″
Displacement at draft	17,320 tons
Deadweight at draft	12,752 tons
Gross measurement	8,407 tons
Net measurement	5,931 tons
Speed specified	13 knots
Cargo capacity	103,417 bbls.
Propulsion power	3,600 S.H.P.

On the round voyage under discussion, she started loaded to International Tanker Summer Draft, or at 12,752 tons displacement.

Her propulsion power plant comprises a cross compound double reduction geared General Electric steam turbine driving a single screw shaft and designed to deliver 3,600 shaft horsepower at 85 r.p.m. of the propeller shaft when fed with steam at 375 pounds throttle pressure and 725 deg. F. throttle temperature.

Steam is generated in two Foster Wheeler marine steam generators of the "D" separately-fired-superheater type, the first of this type installed in a merchant vessel. The working pressure of these boilers is 425 pounds per square inch and the temperature 725 deg. F. Each unit will deliver 50,000 pounds of steam an hour, of which 35,000 pounds can be superheated to 750 deg. F.

The turbines exhaust into a Foster Wheeler condenser which has capacity to condense 34,000 pounds of steam per hour at 28.25 inches Hg. vacuum.

A Worthington centrifugal pump driven by a 60-horsepower electric motor supplies this condenser with 6,200 gallons of cooling water per minute. Worthington centrifugal pumps handle the condensate. Two Worthington 2-stage volute type pumps, each driven by a Sturtevant steam turbine, handle the feed water. Each of these feed pumps has capacity for delivering 115 gallons a minute at 500 lbs. pressure.

Three heaters are used to raise the feed water to 220° F. The first two stages are Davis Paracoil. The third stage is in a Worthington deaerating heater with a capacity of 60,000 lbs. per hour.

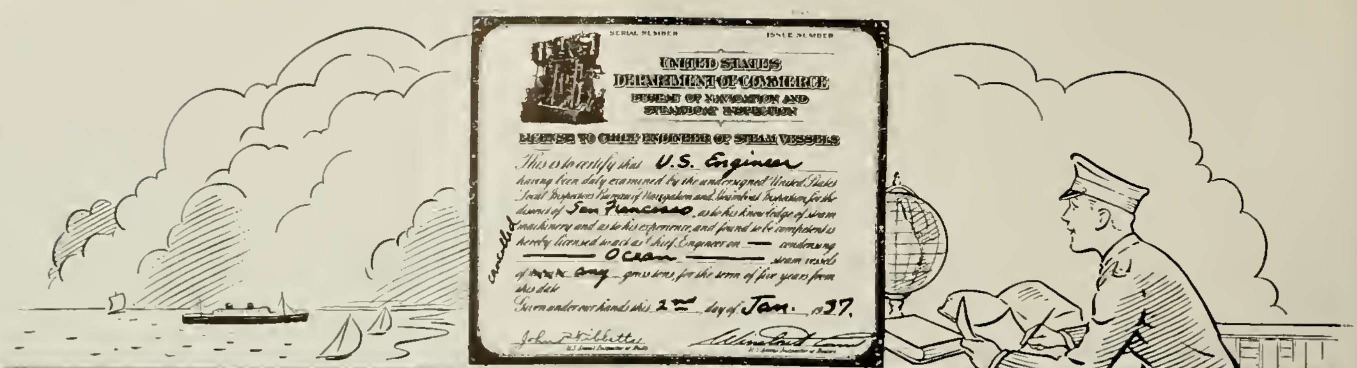
On trials this machinery functioned perfectly. Runs were made at propeller speeds from 65 to 92.2 r.p.m. At the latter speed a torsion meter indicated 4,096 shaft horsepower. Speeds on these runs varied from 10½ to 14 knots. Vacuum maintained at 28.75 to 29 inches Hg. Stack temperatures varied from 190 deg. F. to 275 deg. F. The designed speed was 13 knots at 3,600 S.H.P. and 85 propeller r.p.m. On trial under these conditions Associated made 13.4 knots.

With this background, let's take a look at actual performance on the Pacific in a regular service run.

Here are the figures as taken from the engineer's log:

Distance steamed	12,858 naut. mi.
Steaming time	943 hours, 1 min.
Steaming days	39.3
Distance per day	327 naut. mi.
Distance per hour	13.63 naut. mi.
Speed	13.63 knots
Total fuel consumed	6,995 bbls.
Fuel per day	178 bbls.
Fuel per hour	2,544 lbs.
Fuel per mile	185.5 lbs.
Fuel per deadweight ton mile (based on 12,752 dwt.)	.01532 lbs.

We have made no attempt to reduce these figures to the yardstick of fuel per brake horsepower hour, since the only source of brake horsepower figures available is the calibration curves of the turbine. However, comparing trial results with this showing from the log there would seem to be evidence that had the ship been equipped with a torsion meter she might have hung out a very low record for fuel consumption.


SERIAL NUMBER ISSUE NUMBER

UNITED STATES
DEPARTMENT OF COMMERCE
BUREAU OF NAVIGATION AND
STEAMBOAT INSPECTION

LICENSE TO CHIEF ENGINEER OF STEAM VESSELS

This is to certify that U.S. Engineer having been duly examined by the undersigned United States Local Inspectors Bureau of Navigation and Steamboat Inspection for the district of San Francisco, as to his knowledge of steam machinery and as to his experience, and found to be competent is hereby licensed to act as Chief Engineer on — condensing — Ocean — steam vessels of any gross tons, for the term of five years from this date

Given under our hands this 2nd day of Jan. 1937.

Cancelled

Your Problems Answered

by "The Chief"

The word "Cancelled" was inscribed on face of the above license at the direction of the Bureau of Marine Inspection and Navigation. As used here it means "Specimen Copy."

Feed Water Treatment and Associated Chemistry

I -- INTRODUCTORY

To get a real understanding of the science (for it is really a highly specialized branch of engineering) of boiler feed control is difficult for the operating engineer. It requires branching out from his chosen field of mechanics into chemistry. The responsible engineer will invariably secure the help and cooperation of a reliable chemical firm specializing in water chemistry to assist him in feed water control.

To illustrate the extent to which this science has now progressed "The Chief" makes the definite statement that scale on the water side of boilers, blown tubes, corrosion, pitting, embrittlement and cracks are unnecessary, are not tolerated on modern installations, and where found point to some error in the control of the boiler water. Furthermore the correct procedure can be determined without first experiencing the trouble. Experimenting with the boiler is unnecessary today.

A series of articles on this subject will follow in this section of Pacific Marine Review. In reading these and others, chemical names and formulas will be used, and to tie these up with the engineer's general knowledge we submit herewith a list with brief descriptions of their appearance and uses.

It should be understood that there are many more chemicals, and that those listed have many more uses and may not appear as described. For instance, the description may show a crystal, but the labeled container may be full of a solution of the crystals and hence be a liquid. Also for commercial use chemicals may not be pure and may be discolored. Whether a gas or liquid of course depends on the temperature and pressure. Therefore this list should be used with understanding.

The accompanying list should be retained so that it may be constantly referred to in reading the articles or books on the subject. The reader should add to the list as he runs across other names and substances.

Chemists use the metric system of measurement, in which time is measured in **seconds**, weight in **grams**, and length in **centimeters**. The following conversions apply:

Length

1/10 centimeter=1 millimeter=1/1000 meter

1 centimeter = .3937 inches = 1/100 meter.

10 centimeters = 1 decimeter = 1/10 meter

100 centimeters=1 meter

1 inch=2.54 centimeters

Weight

1 gram=weight of 1 cubic centimeter pure water

1 grain = 1/7000 of 1 pound = .0648 grams

1 gram=15.432 grains

1 gram=.0353 ounce

1 ounce=28.35 grams

1 ounce =1/16 pound

Volume

1 liter=1000 cubic centerimeters

1 liter pure water weighs 1 kilogram

1 kilogram=2.202 pounds

1 gallon = 3.785 liters = 231 cu. inches

1 liter = 61.023 cubic inches

1 cubic inch=16.38 cubic centimeters

1 cubic centimeter = .061 cubic inch

Chemical Formulas

Chemical formulas are simply the chemist's shorthand for describing a substance. The more than 92 chemical elements have each been assigned a letter or letters. Thus for sodium the symbol is Na, for hydrogen it is H, for chlorine it is Cl. For a combination of hydrogen and chlorine it would be HCl, which would be called hydrochloric acid. Where more than one elementary part (atom) of one element is required with one or more parts of another to make an ele-

A List of Chemicals in Common Use

Chemical Name	Chemical Formulas	Common Name	Appearance, Color, Form	Some Uses
Acetic Acid	$HC_2H_3O_2$	Vinegar	Clear or brownish liquid	Mild acid reagent. Used for testing for sulphite
Aluminum Oxide	Al_2O_3	Alumina - Emery	Black or grey crystals. Hard	Abrasive
Aluminum Oxide	$Al_2O_3 . 2H_2O$	Bauxite	Earthen clay	Ore from which aluminum is refined
Aluminum Silicate	$Al_2(SiO_3)_3$	Clay	Greyish earth	Molding. Pottery
Aluminum Silicate	$Al_2O_3 . 2SiO_2 . 2H_2O$	Kaolin		
Aluminum Sulphate	$Al_2(So_4)_3 . 18H_2O$	Alum (filter)	White solid crystals or flakes	Settles suspended matter in water
Ammonia	NH_3	Ammonia	Colorless gas	Refrigeration. Raw material for many chemicals
Ammonium Aluminum Sulphate	$Al_2(So_4)_3(NH_4)_2SO_4 . 24H_2O$	Alum (ammonia)	Clear or white crystals	Medicinal and commercial drug. Coagulant for water treatment
Ammonium Chloride	NH_4Cl	Sal ammoniac	Clear crystals	Battery solution. Electrolyte
Ammonium Hydroxide	NH_4OH	Ammonia. Vol. alkali	Clear liquid	Drug store ammonia. Ammonia gas dissolved in water
Amyl Acetate	$CH_3Co_3 . C_5H_4$	Banana ether	Clear, volatile thin liquid	Thinner in lacquers. Odor of bananas
Amyl Alcohol	$CH_3(CH_2)_3CH_2OH$	Fusel oil	Clear, thin volatile liquid	Commercial and medicinal drug
Arsenic Disulphide	As_2S_2	Realgar		
Arsenic Trisulphide	As_2S_3	Orpiment		
Basic Copper Acetate	$Cu(C_2H_3O_2)_2 . H_2O$	Verdigris	Greenish crystals	Product of corrosion of copper
Basic Lead Acetate	$Pb_2(C_2H_3O_2)_2OH$	Goulard water		
Basic Lead Carbonate	$2PbCO_3 . Pb(OH)_2$	White lead	White powder	Basis of paint pigment
Bichloride of Mercury	$HgCl_2$	Corrosive sublimate	Whitish powder	Medical disinfectant
Calcium Carbonate	$CaCo_3$	Limestone, chalk, marble	White powder or crystalline	Common, domestic and building uses
Calcium Chloride	$CaCl$		Clear crystals	Refrigeration brine
Calcium Hydroxide	$Ca(OH)_2$	Hydrated lime Caustic lime	Whitish powder	Plaster, white wash, water softening
Calcium Oxide		Lime	Whitish rock or crystal	
Calcium Phosphate	$Ca_3(PO_4)_2$	Bone ash	Whitish powder	Fertilizer
Calcium Oxychloride	$CaOCl_2$	Bleaching powder	Whitish powder	Bleaching
Calcium Silicate (Basic)	$Ca(OH)_2 . 4SiO_2$	Mortar	Whitish crystalline	Building
Calcium Sulphide	CaS	Alkali waste		Depilatory
Calcium Sulphate	$CaSo_4$	Plaster of Paris	White powder	Plaster; quick-setting cement
Calcium Sulphate	$CaSo_4 . 2H_2O$	Gypsum	White crystals	Source of plaster of Paris
Carbon	C	Graphite, plumbago	Black flake or powder	Hundreds of well-known common uses
Carbon Dioxide	CO_2	Choke damp, afterdamp	Clear, heavy gas	Product of combustion. Dry ice.
Carbon Monoxide	CO	Carbonic oxide	Clear, heavy gas	Product of incomplete combustion; very poisonous
Carbolic Acid	C_6H_5OH	Phenol, creosote	Clear liquid	Industrial chemical disinfectant; base for dyes
Chromium Oxide	Cr_2O_3	Chrome green	Greenish white crystals	Disinfectant
Copper Arsenite	$CuAsO_3$	Paris green	Greenish powder	Commercial poison
Copper Sulphate	$CuSO_4 . 5H_2O$	Blue vitriol	Bluish crystals	Solution for plating copper. Battery electrolyte
Cupric Carbonate	$2CuCo_3Cu(OH)_2$	Chalk, calcite		
Disodium Phosphate	Na_2HPO_4	Neutral	White crystals	Industrial; water treating
Ethyl Alcohol	C_2H_6O	Grain alcohol	Clear, volatile liquid	Medicinal, beverage, fuel, domestic
Ferric Ferrocyanide	Fe_4FeCN_2	Prussian blue	Blue powder	Paint pigment. Used by engineers for spotting surface
Ferric Oxide	Fe_3O_4	Magnetic oxide	Black crystals or powder	Industrial chemical
Ferric Oxide	$Fe_2O_3 . 3H_2O$	Iron rust	Reddish brown powder	Paint pigment
Ferrous Sulphate	$FeSO_4 . 5H_2O$	Vitriol green		
Ferrous Sulphate	$FeSO_4 . 7H_2O$	Copperas		Coagulant for water purification
Fructose	$C_6H_{12}O_6$	Fruit sugar	Crystals	Candy and fruit packing
Glucose	$C_2H_{10}O_6$	Grape sugar	Crystals	Candy and fruit packing
Graphite Carbon	C	Black lead	Black powder	Paint pigment; lubrication
Hydrochloric Acid	HCl	Muriatic acid	Clear liquid	Industrial chemical
Hydrogen Peroxide	H_2O_2	Hydrogen peroxide	Clear liquid	Medicinal
Hydrogen Oxide	H_2O	Water	Clear liquid	Common water
Hydric Oxide	H_2O	Water	Clear liquid	Common water
Hydrous Aluminum Silicate	$Al_2Si_2O_9 . 4H_2O$	Fuller's earth	Colored earth powder	Filter
Iron Sulphide	FeS_2	Iron pyrites	Greyish crystal	Industrial ore
Lead Chromate	$PbCrO_4$	Chrome yellow	Yellow powder	Paint pigment
Lead Oxide	PbO		Yellow powder	Paint pigment
Magnesium Calcium Carbonate	$MgCO_3 + CaCO_3$	Dolomite	Clear crystals	
Magnesium Hydroxide	$Mg(OH)_2$	Brucite	Clear crystals	
Magnesium Oxide	MgO	Magnesia Talc	Clear white powder	Thermal insulation. Paint pigment
Magnesium Sulphate	$MgSO_4\ 7H_2O$	Epsom salts	Clear crystals	Medicinal
Manganous Acid	H_2MnO_3	Wad		
Mercuric Chloride	$HgCl_2$	Corrosive sublimate	Clear crystals	Medicinal drug
Mercuric Sulphide	HgS	Vermilion	Dark red powder	Paint pigment
Mercurous Chloride	Hg_2Cl_2	Calomel		
Methane	CH_4	Fire damp	Colorless gas	Natural gas fuel
Methyl Alcohol	CH_4O	Methyl alcohol	Colorless volatile liquid	Medicinal
Methyl Alcohol	CH_3OH	Wood alcohol	Colorless volatile liquid	Medicinal
Mono Sodium Phosphate	NaH_2PO_4		Clear crystal	Industrial
Naphthalene	$C_{10}H_8$		Clear crystals	Disinfectant; fuel
Nitric Acid	HNO_3	Aqua fortis	Colorless liquid	Industrial acid; reagent
Nitro-Hydrochloric Acid	$HNO_3 + 3HCl$	Aqua regia	Colorless liquid	Only liquid that will dissolve gold
Nitrous Oxide	N_2O	Laughing gas	Clear gas	Medicinal; dentistry; anesthetic
Oxalic Acid	$H_2C_2O_4$		Clear crystal or powder	Bleaching
Ozone	O_3	Ozone	Colorless gas	Strong oxidizing agent
Phenol	C_6H_5OH	Carbolic acid	Colorless liquid	Commercial creosote; disinfectant
Potassium Acid Tartrate		Cream of tartar	White powder	Food preparation
Potassium Aluminum Sulphate	$3Al_2(SO_4)_3(NH_4)_2SO_4 . 24H_2O$	Alum	Clear liquid	
Potassium Antimonyl Tartrate	$KSbOC_4H_4O_6 . \frac{1}{2}H_2O$	Tartar emetic		
Potassium Carbonate	K_2CO_3	Salt of tartar		
Potassium Carbonate	$K_2CO_3 . 2H_2O$	Pearlash		
Potassium Hydroxide	KOH	Potash	Clear crystals	Strong alkali
Potassium Nitrate	KNO_3	Saltpeter	Greyish crystals	Gun powder; medicinal
Silicon Dioxide	SiO_2	Silica	Clear crystal rock	Building
Silver Nitrate	$AgNO_3$	Lunar caustic	Clear liquid	Medicinal; photographic; test for salt
Sodium Bicarbonate	$NaHCO_3$	Baking soda	White powder	Medicinal; mild alkali
Sodium Carbonate	Na_2CO_3	Soda ash	White powder	Strong alkali; soaps
Sodium Carbonate + Calcium Sulphide	$Na_2CO_3 + CaS$	Black ash		
Sodium Carbonate	$Na_2CO_3 . 10H_2O$	Sal soda	White crystals	Washing; soaps
Sodium Chloride	$NaCl$	Rock salt Table salt	White crystals	Food chemistry
Sodium Dichromate	$Na_2O(CrO_3)_2$		Orange crystals	To prevent corrosion in water cooling systems
Sodium Hydroxide	$NaOH$	Caustic soda Lye	White crystals	Soap; cleaning; disinfectant
Sodium Nitrate		Niter	Whitish flakes or chips	Water conditioning
Sodium Meta Phosphate	$NaPO_3$	Buromin Calgon		
Sodium Potassium Tartrate	$NaKC_4H_4O_6$	Rochelle salt		
Sodium Oleate	$Na(C_{13}H_{33}O_2)$	Soap	Greasy flakes	Soap manufacturing
Sodium Nitrate	$NaNO_3$	Chile saltpeter	White crystals	Coagulant; explosives; medicine
Sodium Silicate	$Na_2Si_4O_9$	Water glass	Clear, sticky liquid	Glue; egg preservative
Sodium Sulphate	Na_2SO_4	Saltcake	White lumps	To adjust water treatment for embrittlement ratio
Sodium Sulphate	$Na_2SO_4 . 10H_2O$	Glauber's salt	White powder	To adjust water treatment for embrittlement ratio
Sodium Tetraborate	$Na_2B_4O_7 . 10H_2O$	Borax	White powder	Washing compounds
Sodium Thiosulphate	$Na_2S_2O_3 . 5H_2O$	Hypo	Clear liquid	Photographic; oxygen testing
Sucrose	$C_{12}H_{22}O_{11}$	Sugar cane	White crystals	Table sugar
Sulphur	S	Brimstone	Yellow crystal, rock or powder	Disinfectant; industrial chemical
Sulphate of Lime		Alabaster		
Sulphuric Acid	H_2SO_4	Oil of vitriol	Clear, oily liquid	Industrial chemical
Trisodium Phosphate	Na_3PO_4	T.S.P.	Light brownish powder	Strong washing compound; varnish remover
Zinc Oxide	ZnO	Zinc white	White powder	Paint pigment
Zinc Sulphate	$ZnSo_4 . 7H_2O$	White vitriol		

This list is incomplete and merely suggestive. There are many commonly used chemical mixtures that do not appear here. The reader should keep this list for reference, as it will be referred to in later articles. He should also keep a supplementary list for other chemicals that may appear in the discussions on this subject.

metary substance, parcel or package (molecule), a number is placed at the lower right hand corner of the symbol. Thus, 1 atom of oxygen unites with 2 atoms of hydrogen to give water, H_2O.

Reference to the extent of substances suspended or dissolved in liquids may be made in several ways, such as **grains per gallon, parts per million, or parts per hundred.** There seems to be no standard, and the reader must be able to understand the several meanings of these references.

In the opinion of "The Chief" the term "parts per million" should be stanardized and used because of the fact that it is the same as pounds per million pounds, or 3 P.P.M. is 3 lbs. of the substance per million pounds of water.

Thus if 1 grain (1/7000 pound) were dissolved in one gallon of pure water the analysis would read 1 grain per gallon. But 1 gallon weighs 8.33 pounds=58,310 grains.

If one pound of salt were dissolved in 1,000,000 pounds of water the analysis would show 1 part per million. This is also true for 1 grain of salt in 1,000,000 grains of water. One million grains of water is 17.1526 gallons, or 1,000,000 divided by 58,310. Thus 1 grain per gallon would be 17.1 times the number of parts per million.

Conversion Table

1 grain per gal.=17.1526 parts per million.

1 part per million=.0583 grains per gallon

1 part per 100,000=.583 grains per gallon

1 part per 100=583 grains per gallon

1 pound per 1,000 gal.=120 parts per million=7 grains per gallon

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Errata

On page 27 of our August issue, in the article on the lighthouse tenders Walnut and Fir, the statement that "Both engines exhaust into a Worthington condenser" is in error. This condenser in each vessel was built by the Moore Dry Dock Company.

Engineers' Licenses for June

Name and Grade	Class	Condition
SAN FRANCISCO		
John G. O'Connor, Chief Eng.	OSS, any GT	RG
Rufus B. Lane, Chief Eng.	OSS, any GT	RG
Frank Deutsch, 1st Asst. Eng.	OSS, any GT	RG
Laurence E. Sutherland, 1st Asst. Eng.	OSS, any GT	RG
James S. Fitts, 1st Asst. Eng.	OSS, any GT	RG
Kenneth R. Kee, 1st Asst. Eng.	OSS, any GT	RG
Edward T. Winslow, 2nd Asst. Eng.	OSS, any GT	O
Lewis S. McClure, 2nd Asst. Eng.	OSS, any GT	RG
Joseph A. Wayne, 2nd Asst. Eng.	OSS, any GT	RG
William H. Walker, 3d Asst. Eng.	OSS, any GT	O
HONOLULU		
Folinga Levi Faufata, 3d Asst. Eng.	OSS, any GT	O
HOQUIAM		
Melvin H. Roen, 3d Asst. Eng.	OMS, any GT	O
PORTLAND		
Charles F. Fairbrass, Chief Eng.	OMS, 750 GT	O
1st Asst. Eng.	OMS, 1000 GT	
2nd Asst. Eng.	OMS, any GT	
Charles W. McClain, 1st Asst. Eng.	OSS, any GT	RG
SAN PEDRO		
John A. Smith, 2nd Asst. Eng.	OSS, any GT	O
SEATTLE		
Joseph Johnson, Chief Eng.	OMS, any GT	RG

Abbreviations: GT is gross tonnage; RG is raised grade; O is original license; OSS is ocean steamer; OMS is ocean motorship.

New Method of Invisible Branding for Secret Identification

In the "Hall of the Future" in the Massachusetts Building at the New York World's Fair, the Plymouth Cordage Company of Plymouth, Mass., has an exhibit of scientific value to industry which consists of a patented process recently developed by them for the marking and authentication of manufactured products by means of fluorescent materials. The markings are visible only under ultra violet light. The specimens shown within the cabinet appear first in their natural state where the markings are not visible, and then under the ultra violet light these markings come into prominence.

There has been a long-felt need for a satisfactory way of marking branded products invisibly to provide the manufacturer with a secret means of identification and to permit or assist in the detection of fraudulent imitations, counterfeiting or substitution. This need has now been acceptably filled in many fields, as is demonstrated by the material included in the exhibit. This new marking method is especially successful with textiles in general, and with paper for various uses. Fiberlite paper, in which activated fibers are incorporated during manufacture, is of particular value authenticating negotiable instruments, manuscripts, paper money, labels, ticket stock, bristol board for boxes, etc.

Several pieces of marked clothing serve to show the application of this idea in laundry marking. This application, developed originally at Plymouth, has been introduced since in over 250 laundries throughout the country by a laundry marking machine company under license from the Plymouth Cordage Company.

Fluorescent means of marking is not without application to cordage. It is possible to include one or more activated yarns in a rope for the purpose of secret identification of ownership. Short lengths of rope containing activated yarns are included in the cabinet display as examples of this use.

Steady as you go!

KNOWLEDGE IS THE STRAIGHT COURSE TO ADVANCEMENT

A Department for Deck Officers

PROGRESS IN THE ART OF NAVIGATION

One of the four things that were mysteries to the very wise author of the book of Proverbs was, "The way of a ship in the midst of the sea." Ever since that unknown date long before the time of Solomon, when some ancient mariner sailed or rowed his vessel out of sight of land and found himself surrounded by the "vasty deep" men of many nations have sought out means of knowing the best "ways" for a ship at sea. From all this effort has evolved the modern art of navigation.

We call it an art advisedly because, while much of it is based on such pure science as astronomy and astronomical mathematics, the major part of its practical application is based on empiric rules and court decisions concerning those rules.

There was a day, now long past, when the transpacific or transatlantic navigator might almost count on crossing without sighting another sail or smoke. In those days that navigator was principally concerned in knowing three main factors: (1) just where on the surface of the ocean his craft was sailing; (2) how fast and in what exact direction she was going; and (3) into what weather she was heading.

The inventions of the sextant, the chronometer, and the ship's log, together with corrections in the nautical almanac, had solved with reasonable accuracy the calculation of the first two factors by the beginning of the 19th century. Matthew Fontain Maury's work on oceanography had practically solved the third factor by the middle of that century.

The record of sailing ship passages from 1845 to the present day bear eloquent testimony to the practical efficiency of the navigation methods based on these inventions and this early scientific investigation.

Many shipmasters of all principal maritime countries used the method of "dead reckoning" (checked by solar and stellar observations and the ship's chronometer) with a skill and precision which was and is an amazing tribute to human capacity. An American Clipper out of Boston or New York round the Horn to San Francisco might log 12,000 miles without sighting land, or communicating in any way with her owners, the consignees of her cargo, or the relatives of her passengers, officers, or crew. She might be 100 days, she might be 200, on her "way in the midst of the sea," but on every one of those days the "old man" must know from his calculations (checked by those of his officers) just where on that way his ship was at any particular time. No wonder that such a life of seafaring bred men of indomitable character and quick decision.

Introduction of self-propulsion made this position-finding phase of navigation somewhat simpler. A steamer or motorship driving on a set course may be figured for position much more easily than a sailing ship beating up into the wind on a series of tacks.

Along with power also came many improved devices and new inventions that make this phase of navigation almost automatic. Among the improvements are: The new types of magnetic compass; the electric sounding machine; various forms of speed indicators and recorders, and the submarine signal. The new inventions include: Gyroscopic compass; gyro helmsman; course recorders; echo sounding devices; radio communications; radio direction finders; and radio sound signal combinations.

Supplementing all of these is the magnificent work done by the hydrographic and coast surveys of Europe and America in spotting accurately on charts the various hindrances to free navigation and the character and profile of sea bottom.

On a modern fully-equipped passenger or cargo liner position navigation has become very largely an automatic function of knowing which knob to turn, which button to push. Vessels of this type make their schedules as regularly as a train on land.

Emergencies sometimes prevent a train from making schedules, and sometimes a ship meets emergencies. While all this improvement has been evolving in "positional" navigation, that other and equally important part of that art, which comes under the general heading, "Rules of the Road at Sea," is getting no simpler but, if anything, more complicated.

Many a deck officer skilled and perfectly competent to determine the "way of a ship in the midst of the sea" has had his valued license revoked and/or his hopes of promotion deferred indefinitely because in some emergency he has failed momentarily in his mental grasp of the application of some "Rule of the Road."

In an article published some time back in Pacific Marine Review, R. F. Farwell of the University of Washington poses a test for ship officers. Says he:

"If you are a licensed officer and feel satisfied that your daily experience is sufficient to keep the rules fresh in your mind, and to prepare you to act properly in any situation that may arise, it is suggested that you try yourself on the following questions:

"1. Under what circumstances is a vessel required to hold her course and speed?

"2. Under what rules would you operate in making a voyage from San Francisco to Seattle?

"3. You are on a steamer at sea in a fog and your engines break down. What fog signal will you use?

"4. Under what circumstances does a tug carry three white lights in a vertical line?

"5. What rule makes it necessary to have a lookout?

"6. When would you blow three short blasts in a fog?

"7. When must you keep a lookout astern?

"8. You are on a steamer being towed from one dock to another in inland waters at night. What lights will you carry?

"9. At sea you meet another steamer in the crossing situation and you have the right of way. What sound signal can you give?

"10. What is the difference between a signal of two blasts under international rules and the same signal under inland rules?

"If you can answer the above questions offhand, you are probably one of the few navigators who have a clear knowledge of the rules of the road."

It is suggested that you take time off here and study these questions a little and write your own answers. Then compare your answers with the following, which are the correct answers:

1. (a) A steamer in the crossing situation having the right of way over the other steamer; (b) any vessel overtaken by another vessel; (c) a sailing vessel meeting a steamer; (d) a sailing vessel closehauled meeting a sailing vessel running free; (e) a sailing vessel closehauled on the starboard tack meeting a sailing vessel closehauled on the port tack; (f) a sailing vessel running free with the wind on the starboard side meeting a sailing vessel running free with the wind on the port side; (g) the leeward vessel when two sailing vessels running free with the wind on the same side approach each other; (h) a sailing vessel with the wind anywhere but aft meeting a sailing vessel with the wind aft.

2. From San Francisco to sea under inland and pilot rules; thence to the limits of inland waters on the Strait of Juan de Fuca under international rules; thence to Seattle under inland and pilot rules.

3. One long and two short blasts of the whistle at intervals not exceeding two minutes.

4. When she is towing more than one vessel and the length of the tow from the stern of the tug to the stern of the last vessel in the tow exceeds 600 feet.

5. Article 29: Nothing in these rules shall exonerate any vessel, or the owner or master or crew thereof, from the consequences of any neglect to carry lights or signals, or of any neglect to keep a proper lookout, or of the neglect of any precaution which may be required by the ordinary practice of seamen, or by the special circumstances of the case.

6. When another vessel is in sight and your engines are going full speed astern.

7. (a) When leaving anchorage or moorings; (b) when going astern; (c) at night when no fixed stern light is carried; (d) at all times when changing course.

8. All running lights.

9. A detonating signal.

10. (a) Under international rules signifies change of course to port; (b) under inland rules signifies a starboard to starboard passing, whether or not a change of course is required.

It is our intention to devote some of the following "Steady as You Go" sections to consideration of some of the special problems of operating correctly under "Rules of the Road at Sea" for certain emergency and perilous conditions. We would appreciate constructive comment, correction and criticism as these may occur to any of our readers.

Progress in the Motorship

Signal progress in the perfection of the ocean-going motorship in its brief quarter-century development is evidenced in the current report of the operation of the new M.S. Selandia of the East Asiatic Company, Ltd., of Copenhagen.

Launched July 27 last year, the M.S. Selandia (named for the first ocean-going motorship Selandia, built in 1911 by the noted Danish firm, Burmeister & Wain) has been in the East Asiatic Line's regular service between Copenhagen and Bangkok since October, 1938.

Conforming with the highest maritime standards and requirements, the Selandia represents the utmost in development of mechanical efficiency, incorporating every modern passenger facility.

The Selandia has been built to Lloyd's highest class, plus 100 A.1., as a complete superstructure ship with long bridge and forecastle, and in conformity with the requirements of the London Convention of 1929, regarding safety of human life at sea, as well as with the Danish Regulations for passenger motorships.

In the 26 years elapsed since the first Selandia was commissioned, developments in the construction of diesel engines and their manufacture have taken place at such rapid pace that it was very soon possible to pronounce the diesel motor triumphant in the propulsion of ships in fleets of all the more important seafaring nations of the world.

Of the total world tonnage, comprising approximately 66 million gross register tons, about 12 million tons, or 20 per cent, consists of motor tonnage. Of this 12 million tons, about 4.8 million tons, or 40 per cent, are fitted with Burmeister & Wain engines.

Parallel to this development in the marine diesel, a corresponding development has taken place in the electrical installation of ships. Electricity is now utilized throughout a vessel for lighting, cooking, laundry and power for all machinery, from the smallest ventilator or beauty shop equipment to the navigation of the ship itself. As an example of this development, in the Selandia over 16 miles of insulated wires, 1,100 lamps and 150 electric motors are to be found.

In comparing the perfected development of the new Selandia with its pioneer predecessor of 1911, it is interesting to look briefly at the propulsion plants of the two vessels.

The new Selandia is propelled by one 5-cylinder B. & W. double-acting two-stroke motor, working on one screw shaft, developing normally 7,300 indicated horsepower, giving 16 knots speed.

The former Selandia was propelled by two 8-cylinder, four-stroke single-acting diesels working on two screw shafts developing 2,500 indicated horsepower, giving 12 knots speed.

The efficiency of the marine diesel engine is evidenced by the fact that during the 25 years the original Selandia was in service of the East Asiatic Company, she sailed 1,200,000 miles, consuming 43,000 tons of fuel oil, the engine making no less than one billion, eight hundred million revolutions.

The original Selandia carried twenty-two passengers, while the new vessel accommodates fifty-four. The latter's twenty-two double and ten single staterooms are furnished with large beds, wardrobes, and private baths. The dining and social saloons, including a modern bar, are beautifully appointed. All cabins and saloons are air conditioned and are equipped with a sound-deadening rubber floor covering.

The East Asiatic Line operates a fleet of 26 modern motorships aggregating 181,524 gross register tons and 239,178 tons deadweight. Its regular services include the Europe-Pacific Coast, Europe-Bangkok and Europe-Orient runs.

Deck Officers' Licenses for June

Name and Grade	Class	Condition
SAN FRANCISCO		
Earle L. Evey, Master	OSS, any GT	RG
Allen Cameron, Chief Mate	OSS, any GT	RG
Walter J. Sattel, Chief Mate	OSS, any GT	RG
Donald E. Beach, 3d Mate	OSS, any GT	O
Robert C. Burge, 3d Mate	OSS, any GT	O
George A. Zepaloff, 3d Mate	OSS, any GT	O
JUNEAU		
Reubin Jacobsen, Chief Mate	OSS, any GT	RG
PORTLAND		
Phillip V. Sullivan, Chief Mate	CWSS&MS, 500 GT	RG
2nd Mate	OSS, any GT	
SAN PEDRO		
James Evans, Master & Pilot	OSS, any GT	RG
Russel B. Grotemate, Master & Pilot	OSS, 1250 GT	O
Farrell N. C. Overall, Master	OSS, 5000 GT	O
Davis S. Dewey, Chief Mate	CWSS, 750 GT	O
Lester L. Carroll, Chief Mate	OSS, any GT	RG
Russell W. Thomas, Chief Mate	OSS, any GT	RG
John R. Hafstad, 3d Mate	OSS, any GT	O
Jens P. M. Olsen, 3d Mate	OSS, any GT	O
Clarence W. Sullivan, 3d Mate	OSS, any GT	O
SEATTLE		
Arthur Hannes Eskola, 3d Mate	OSS, any GT	O

Abbreviations: GT is gross tonnage; RG is raised grade; O is original license; OSS is ocean steamer; OMS is ocean motorship.

Change of Masters

Steamer Nebraskan: O. L. Thomson; vice, W. M. Strong.
Steamer District of Columbia: H. O. Bleumchen; vice, W. R. Holden.
Steamer San Felipe: E. D. Olson; vice, W. Larsen.
Steamer D. G. Scofield: R. Weishaer; vice, G. A. Johnson.
Steamer Silverado: K. H. Carlson; vice, N. Nielsen.
Steamer Anna Schafer: O. O. Hana; vice, F. E. Anderson.
Steamer Margaret Schafer: J. E. Anderson; vice, P. N. Johnson
Steamer Mericos H. Whittier: G. B. Macdonald; vice, H. Pitts.
Steamer Solana: O. Bengston; vice, G. A. Moerman.
Steamer Hawaiian: R. M. Pierce; vice, S. A. Gates.
Steamer Point Ancha: W. T. Johnson; vice, J. T. Larsen.
Steamer Makiki: F. I. Hamma; vice, Stephen G. King.
Steamer Cathwood: K. H. Youngberg; vice, H. Phillipson.
Steamer Elna: H. L. Poulson; vice, Carl Johannson.
Steamer Edwin Christenson: J. W. Stenlund; vice, W. Warrer.
Steamer Paul Shoup: M. M. Melon; vice, Robert W. Kelly.
Steamer Coast Miller: L. A. Rasmussen; vice, A. H. Watkin.
Steamer Mauna Ala: L. A. Petersen; vice, C. A. Saunders.
Steamer Solana: G. A. Moerman; vice, O. Bangston.
Steamer Felix Taussig: N. A. Nielsen; vice, M. G. Anderson.
Steamer Antietam: F. B. Arthur; vice, C. H. Winnett.
Steamer Los Angeles: E. A. Ojstadt; vice, Otto Weideman.
Steamer H. M. Storey: G. A. Johnson; vice, Thomas A. Hill.
Steamer Matsonia: Frank A. Johnson; vice, E. Hubbenette.
Steamer Indianan: B. Leep; vice, T. R. Boothby.
M.S. H. T. Harper: O. Baker; vice, L. C. Hansen.
Steamer West Shipper: Karl E. Moden; vice, E. Mesak.
Steamer S. C. T. Dodd: R. M. Melbye; vice, L. J. Williams.
Steamer Point Lobos: K. T. Londberg; vice, Peter E. Odeen.

A Notable New

Pacific-European Motorship

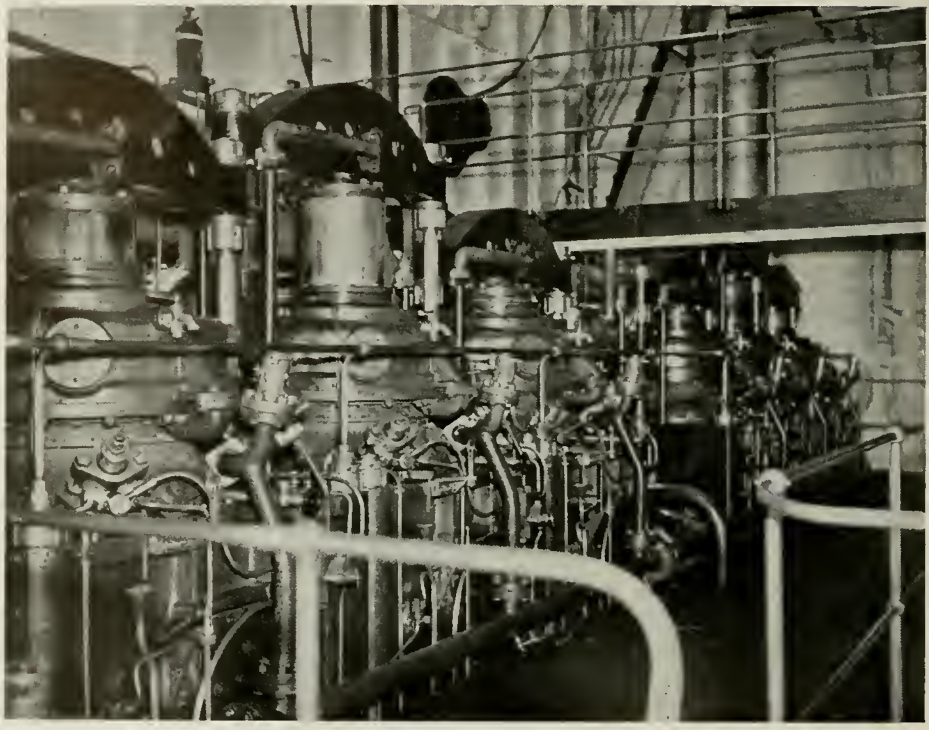
Blue Star Line Adding Three Refrigerated Cargo Passenger Liners to this Service

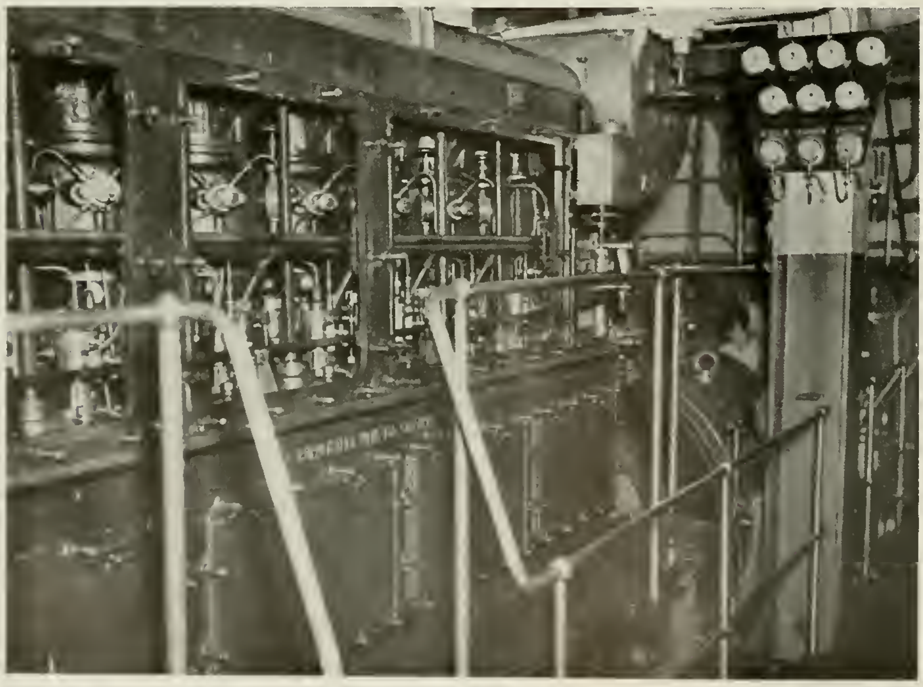
The Blue Star Line motorship Columbia Star visited San Francisco during July on her maiden voyage. She is one of three new vessels built for this line by Burmeister and Wain of Copenhagen, Denmark. The other two are named respectively Canadian Star and California Star.

These vessels have the following principal characteristics:

Length B. P.	440 feet
Beam molded	60 feet
Depth molded	39 feet
Draft loaded	26 feet 7 inches
Deadweight capacity	10,190 tons
Refrigerated cubic cap.	385,000 cubic feet
Propulsion power	7,300 B.H.P.
Sea service speed	15½ knots
Passenger capacity	12-24

She is a single screw ship with raked stem and cruiser stern, a rather long erection amidships housing the officers and first class





A big six-cylinder Burmeister & Wain double acting, 2-cycle diesel propels this ship. The upper cylinder heads and piston valve yokes of this engine are shown above. At left is depicted one of the three Burmeister & Wain engines driving Thrige 280-KW generators for electric light and power.

SAN FRANCISCO
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PERIODICAL DEPT.

accommodation for 12-24 passengers. The hull is of heavy riveted construction to Lloyd's Class A 1 for vessels of this type.

Her refrigerative capacity entitles her to consideration as among the largest perishable cargo carriers serving the Pacific Coast.

As in all modern fruit and vegetable refrigerative carriers, she carries a system combining direct chilling by brine circulation with cooling by means of cold air recirculated through coils in which cold brine is kept circulating. Two control rooms regulate the various factors incident to correct refrigeration transport. Chambers may be held at any temperature from a little above zero up to 60 deg. F.

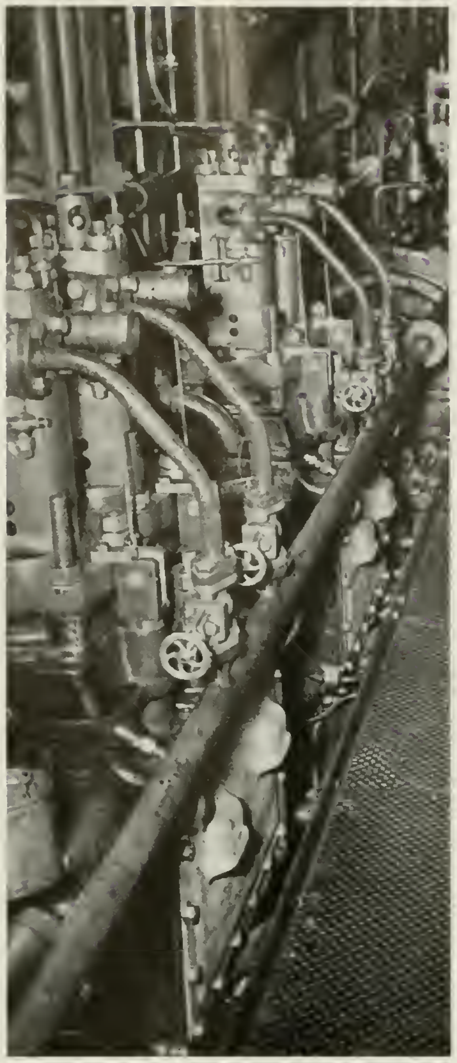
Recording and indicating instruments enable the refrigerating engineer to know at any moment the temperature, the humidity, and the relative CO_2 content of the air circulating in any refrigeration chamber.

Refrigeration machinery was supplied by Sabroe. Three Co_2 compressors are installed, each driven by an electric motor supplied by Thomas Thrige of Odense, Denmark. Two compressors take care of the normal refrigeration load, so that one is a standby for cargo insurance.

The staff of Pacific Marine Review had the privilege of inspecting the engine room of Columbia Star through the courtesy of the General Engineering & Dry Dock Co., who handle routine voyage repairs for the Blue Star Line.

Her main propulsion unit is a 2 - cycle, double-acting, six - cylinder Burmeister and Wain directly reversible diesel engine. Each cylinder has 620 mm. bore and 1400 mm. stroke, and the engine develops 8,600 I.H.P. at 115 r.p.m. Test stand results show for this engine 7,000 B.H.P. at 105 r.p.m. and we understand from reports by the engine room staff that the Columbia Star runs handily at 15.5 knots loaded sea speed on 105 propeller r.p.m., and made much better speeds in calm weather on the run up from the Canal.

Fuel consumption results on the test stand gave 0.326 pounds per brake horsepower hour for this engine. The mean indicated pressure is around 96 pounds per square inch. Fuel pumps, one for each end of each cylinder, are driven by a camshaft. There are two fuel valves at each end of each cylinder.



The heart of a modern diesel engine is the fuel pump. Here are a few of those used on the main engine. Two for each cylinder.

Scavenging air is admitted through a ring of ports at the center of the cylinder, and exhaust is through a ring of ports at the outer ends of the cylinder. The opening of exhaust ports is controlled by a piston valve in each cylinder end. These two valves in each cylinder are carried on yokes that are connected solidly by two rods outside each cylinder. Movement of this yoke and valve assembly is from eccentric rods actuated off the crankshaft. Exhaust ports open first, so that when scavenge ports open the gases in cylinder are practically at atmospheric pressure and clean air sweeps through the cylinder with sufficient velocity to insure good scavenging.

Main pistons and piston valves are oil cooled, the oil being dealt with by the same system as the lubricating oil for the main engine. Three Tyfon centrifugal oil purifiers keep this oil clean.

Scavenge air is supplied by two blowers of the rotary positive displacement type driven by chain from the crankshaft.

All auxiliaries are electric drive; the complete electrical installation was supplied by Thomas Thrige of Odense. Electric power is generated by three 6-cylinder Burmeister and Wain single-acting, trunk piston diesel engines direct connected to Thrige 280-K.W. 220-volt generators.

Steam for heating, cooling and laundry service is derived from an exhaust gas boiler or from an oil fired boiler.

All operating functions of the main engine are controlled from a single station on the lower engine room grating. At this station the engineer on watch has in full view thermometers, pressure gages and flow indicators, which enable him to judge the degree of perfection with which each cylinder and pump is functioning.

The passengers testify that this engine is so perfectly balanced and operates so smoothly that there is no perceptible vibration or noise from that source in their rooms or on deck.

Trade Literature

Belting Biographies, a 36-page booklet published by the Mechanical Goods Division, United States Rubber Co., represents a novel and interesting method of cataloging the company's belting products, in that it shows case histories, dramatically illustrated. These depict "U. S." installations, large and small, in industries ranging from the manufacture of spaghetti to heavy mining and industrial operations.

This booklet contains much technical information, including data on the selection of the proper belt, installation, speed of operation, pulley size, tension and carrying capacity.

Export Vessels Install "Cargocaire" System

Four New Cargo Liners of the Export Steamship Company Adopt New Method of Cargo Ventilation

American Export Lines, after thorough investigation, have decided to install the Colby-Colvin "Cargocaire" system of hold ventilation in their four new, fast cargo liners now under construction in the Fore River Plant of the Shipbuilding Division of the Bethlehem Steel Company.

This system will be applied to the uninsulated cargo holds Nos. 2, 3 and 6. It is based on the principle of mechanical injection of treated air into the cargo holds and throughout the cargo. This air is recirculated with controlled admission of fresh treated air.

The "Cargocaire" equipment consists of two separate and distinct parts. The first of these is the air treating and moving unit. The second is the air recirculating unit.

On the Export ships the first part is located in the refrigerating compressor room on the third deck. It consists of: two "Cargocaire" Silica Gel filter and absorbent units equipped with water coils for cooling and steam coils for heating; and two positive displacement Roots-type blowers driven by Vee belt from a 15-H.P. electric motor.

The second or recirculating part consists of two blowers for each hold. On the Export ships these are 24-inch propeller type fans each driven by a ¾-H.P. motor and each capable of delivering 4700 cubic feet of air a minute. The intake ducts for these fans pass through small steel deck houses and the fans are mounted inside the ducts in way of these houses. These ducts are cross connected above the fans and the holds are vented by suitable ducts connected to the king posts, which are capped by weatherproof exhaust louvers.

In operation, air enters the filter and absorbent units through the filters. It passes then in rotation through the first cooling coil, the first heating coil, the first absorber bed, the second cooling coil, the second heating coil, the second absorber bed, and out through the bottom to the blower suctions. When cold water is circulated in the cooling coils the Silica Gel absorbs the moisture and the cool dried air is delivered to the holds.

The two identical units are connected up in such manner that periodically they are interchanged for cleaning the moisture and dirt out of absorber and filter beds. With steam circulating on one side, one of the blowers pumps outside air through that side, the Silica Gel gives up its moisture to this air and the warm, moist air is discharged overboard.

The treated air delivered to the holds is recirculated through the hold by the propeller blowers on the shelter deck. These blowers can also be used when desired to pump large quantities of outside air through the hold and its cargo, discharging this air at the tops of king posts. Five times the quantity possible with the customary natural ventilation may thus be circulated through cargo and cargo space.

It is obvious that any gas can be circulated through this system for fumigation, fire extinguishing or fire prevention, and for special treatment for certain cargoes.

Advantage of the "Cargocaire" method is positive circulation of correctly treated air, thereby eliminating most of the causes of ordinary cargo damage and saving the shipper and the ship operator much expense.

A complete story of the development of this system and its application to the prevention of damage to cargo in ships' holds will be found in the "Steady As You Go" section of the Pacific Marine Review, beginning in the December, 1938, issue and running serially to the issue for June, 1939.

THE NEW POROUS RUBBER

At first used in the making of bathing suits and in the manufacture of corsets and girdles, Multipore, a porous rubber sheeting, is rapidly finding its way into many mechanical applications.

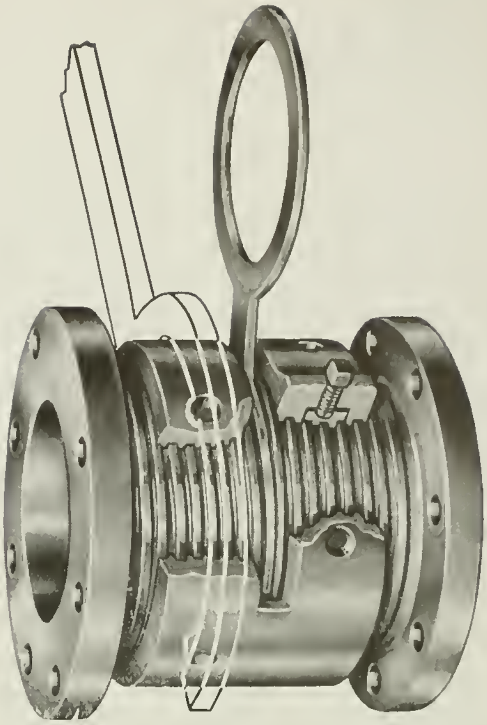
Latest use to which this new rubber product has been applied is in the chemical industry, primarily in connection with various filtration and clarification operations.

Multipore is made from latex by a patented process, and derives its porous characteristics from the many minute, uniformly spaced holes formed in the sheet simultaneously with the processing of the liquid latex.

Multipore may be made with from 1100 to 6400 holes per square inch, and with pore diameter of from 0.012 to 0.004 inches. The holes are produced before the rubber is vulcanized, permitting variations in the shape and porous characteristics through stretching and other operations before curing.

The porous characteristics of this material is obtained by the introduction of thin layers of liquid latex successively applied on an endless belt which passes over a series of platens and idlers. By manipulating this equipment various degrees of porosity can be obtained, and the pore size and thickness of the material can be controlled with remarkable accuracy.

An Old Problem Solved by Simple Device



S. & J. Standard Line Blind.

Ever since refineries began dividing up petroleum into its various derivities and tankers began handling these derivities in bulk the problem of blanking off pipe lines with absolute tightness to prevent interpollution of products has been one of considerable magnitude and expense. The method in vogue for years, and still almost universally practiced, provides flanged joints in the pipe line between which a spectacle frame is compressed. One end of this frame is an open ring; the other end, a blank; both ends being of dimensions to fit the flanges.

The process of blanking or opening the pipe line consists of removing six to ten bolts from the flanges, prying the flanges apart, pulling out and reversing the spectacle frame, bringing the flanges together and lining them up, inserting all bolts and tightening the nuts to make a tight joint on each side of the spectacle. In a large refinery, tank farm, or loading terminal there are many of these so-called "Line Blinds," and their reversal and adjustment consumes a lot of time.

Recently at the Richmond Refinery of the Standard Oil Company of California there has been developed a special fitting known as a "Line Blind" that simplifies this process to such an extent that a pipeline can be changed from shut off to open by one man in less than a minute.

This fitting is now in process of manufacture by the Shand and Jurs Co. of Berkeley, California, under the name S. & J. Standard Line Blind.

Its component parts are:

(1) A spectacle frame grooved for gaskets.

(2) A pair of flanged nipples, one with right-hand, the other with left-hand threads and both finished on the threaded end to fit the bearing surfaces of the spectacle frame.

(3) A sleeve threaded internally to fit the nipples, and slotted at its center (see cut) to admit the spectacle frame.

With this simple assembly and a spanner wrench fitted to the sleeve it is possible for one workman to manipulate the shift of the spectacle frame in less time than it takes to read about how he does it. A twist of the sleeve in one direction forces the ends of the nipples apart and allows the workmen to easily pull out and reverse the spectacle frame. When the reversed frame is in place a twist of the sleeve in the other direction tightens the nipples against the gasket surfaces of the spectacle frame and makes a positively tight joint.

The nipple flange is made to standard gate valve flange dimensions, and the entire assembly has an over-all length between flange faces the same as that for a standard gate valve.

The S. & J. Standard Line Blinds are manufactured in sizes to suit 4-in., 6-in., 8-in. and 10-in. pipe lines and will be built of materials to suit any service conditions.

The obvious design simplicity of these "Blinds" and the possible economies incident to their use should very strongly recommend them for oil refineries, pumping stations, tankers, tank farms, wet process manufacturing plants, and any application where blind flanging is necessary for positive tightness.

Trade Literature

"Tremendous Trifles," a new booklet issued by The International Nickel Company, emphasizes the importance of small items of equipment, such as springs, bolts, electrical contact points and the like in making the wheels of industry run smoothly.

Sixteen pages in size, with illustrations and charts, it presents technical and mechanical data on nickel, Monel, Inconel, "Z" Nickel, "K" Monel, and other high nickel alloys as used for such parts under service conditions where ordinary materials might fail.

Separate sections are devoted to discussion of seven different problems. These involve resistance to heat, to vibration, to corrosion, to spark erosion, and to wear. The other two sections are devoted to corrosion-resistant springs and to various accessories for use where attractive appearance is essential.

Shipbuilding AT LONG BEACH

A Short History of a Long-Established Pacific Coast Yard and a Statement of Its Present Position

Launching a submarine at Craig's

The plant of the Craig Shipbuilding Company was established in Long Beach in 1907 by John F. Craig, present chairman of the board. Previously this plant had been located in Toledo, Ohio, and at the time of coming to the Coast there were already some sixteen vessels on the Pacific Coast which had been constructed in Toledo. Among these were the Meteor, Redondo, Buckman, Watson, Iriquois, Chippewa and Indianapolis. At that time Long Beach Harbor was a slough and the entrance channel was blocked by a piling trestle which was later replaced by a steel bascule bridge. With the establishment of the shipyard the harbor was dredged and the first vessel to be built was the wooden tug Virgil G. Bogue for the Western Pacific Railroad, which last year was sunk in collision in Oakland Channel.

The first steam schooner built at the Long Beach plant was the General Hubbard, which was launched December 3, 1910. This vessel was for the Hammond Lumber Company, and plied for many years in the coastwise lumber trade. Later the Navajo, Camino, Grace Dollar, Paraiso and other vessels were built.

In 1916, just prior to the entrance of the United States into the war, the U. S. submarines L-6 and L-7 were built, and later three more subs, the O-14, 15 and 16, were constructed. During the war period the plant constructed the conventional 8,800-ton type cargo carriers and also three 6,000-ton ships, as well as three 3,200-ton vessels, which are now operating on the Coast, namely, the Silverado, Eldorado and Wallingford. During the 1920s several small steel vessels were built, including the tanker San Diegan and the tug H. T. Haviside.

Since the War, every steel yacht over sixty feet constructed on the Pacific Coast has been built in this plant. In 1932 the Craig Shipbuilding Company was the only shipyard on the Pacific Coast to realize any work created by the Jones-White Act. This was accomplished in the reconditioning of the S.S. Point Lobos and the S.S. Point Ancha for the Gulf Pacific Mail Line, operated by Swayne & Hoyt.

While it is leasing the mold loft, building berth, punch shop and other building facilities to the Consolidated Steel Company for the ship assembling activities of that firm, the Craig Shipbuilding Company will carry on its present repair work, maintaining its offices and operating the drydock and machine shop, and will have use of the other units when necessary for executing larger drydock repairs.

Gulf Pacific Mail Lines' steamship Point Ancha.

An Economical *River and Harbor Tug*

Anderson and Cristofani of San Francisco recently delivered to the San Francisco Towing Company a sturdy wooden tug named Ruth Freese, which is proving to be an efficient and handy workboat for harbor and river work.

She was built for general towing work and was especially designed for handling 5,000-barrel oil barges on the Sacramento River run from San Francisco to Sacramento.

Her principal characteristics are:

Length	64′ 10″
Beam	15′ 0″
Depth	8′ 4″
Power	300 S.H.P.
Speed	10½ knots
Bunker capacity	1,500 gallons
Lube oil capacity	62 gallons

The propulsion unit is a six-cylinder, four-cycle, directly-reversible mechanical-injection Enterprise diesel engine, with 15-inch bore and 12-in. stroke and generating 300 S.H.P. at 300 r.p.m.

This engine swings a right-handed, 3-blade Pitchometer propeller of 42-inch diameter and 72-inch pitch. In designing this power plant a careful analysis was made covering the engine shaft, thrust shaft, intermediate shaft and propeller shaft, and the shafting was proportioned to eliminate the possibility of any of its critical speeds falling within the operating speed range.

A Westinghouse 32-volt generator driven by Vee belt from the main flywheel supplies electric light in conjunction with a set of Exide storage batteries.

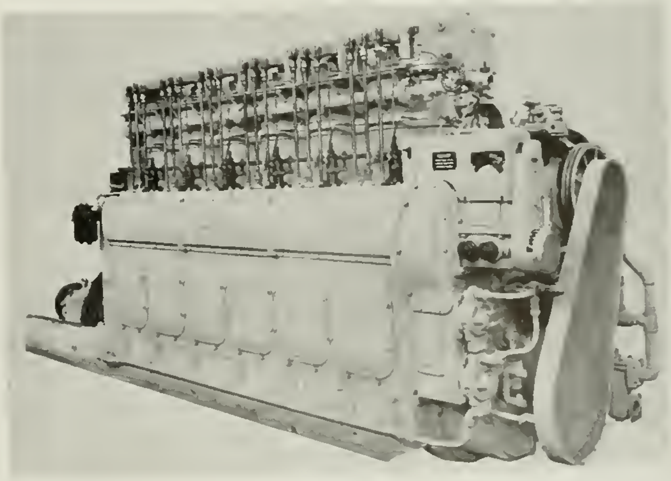
The engine is fitted with: An Alnor pyrometer, which indicates temperatures for each cylinder; a Weston tachometer for continuous revolution speed indication; a Harrison lubricating oil cooler; Purolator lube and fuel oil strainers; and a Maxim SC-2 spark arrester-muffler.

Control of the engine is of the single lever type for reversal and for fuel injection. A push button in the handle of this lever operates the automatic starting valve on the engine.

An interconnecting identical control is installed in the pilot house. The control stand in the pilot house is wired for dim illumination at night so as to show the position of maneuvering gear at any time without distracting the attention of the helmsman. The entire control mechanism in the pilot house is built of non-magnetic materials.

Due to the comparatively light weight and small length of this engine the designers of the hull of the Ruth Freese were able to install her towing bitts in the most advantageous position just a few feet aft of the longitudinal center. This fact gives the tug ideal maneuverability, a quality that is especially desirable in river towing work.

On tows with a 5,000-barrel oil barge to Sacramento and return she runs at 6½ knots upstream loaded, with a diesel fuel consumption of 15 gallons an hour. Fifteen hours is taken for the run up with a loaded barge; 12 hours for the run down with a light barge.



This Enterprise diesel engine drives Ruth Freese up the Sacramento River at 6½ knots speed when she is towing a 5,000-barrel oil barge. She consumes 15 gallons of diesel fuel an hour on this run.

On the Ways–

SHIPS IN THE MAKING

LATEST NEWS FROM AMERICAN SHIPYARDS

VESSELS UNDER CONSTRUCTION AND/OR UNDER CONTRACT IN U. S. YARDS

AUGUST 1ST, 1939

TO AMERICAN BUREAU OF SHIPPING CLASSIFICATION

Builder	*Hull No.*	*Type Size*	*Power*	*Owner*	*No. of Vessels*	*Gr. Tons (Est.)*
SEAGOING:						
Bethlehem Steel Co. Sparrows Point, Md.	4329-30-1	Oil Tanker 525'x75'x39'	Steam 12000 H. P.	Standard Oil Co. of N. J.	(3)	11500 ea.
do	4337-8-9	Pass. Cargo Vessel 465'x65'6"x39'9"	Steam 8600 H. P.	Mississippi Shipp. Co.	(3)	8300 ea.
do	4340	Oil Tanker 442'x64'x34'10"	Steam 3500 H. P.	Union Oil Co. of Cal.	(1)	8000
Bethlehem Steel Co. Quincy, Mass.	1469	Pass. Cargo Vessel 471'8"x64'x38'6"	Steam 8000 H. P.	Panama RR SS Line	(1)	9000
do	1474 to 1477	Cargo Vessel 450'x66'x33'4½"	Steam 8000 H. P.	American Export Lines, Inc.	(4)	8500 ea.
Bethlehem Steel Co. Staten Island, N. Y.	8001-2-3	Tug 195'x38'6"x22'	Diesel Elec. 3000 H. P.	U. S. Navy	(3)	1150 ea.
Charleston S.B. & D.D. Co. Charleston, S. C.	5500	Cargo Vessel 284'x42'x19'	Diesel 900 H. P.	Erie & St. Lawrence Corp.	(1)	1700
Federal S.B. & D.D. Co. Kearny, N. J.	153	Oil Tanker 525'x75'x39'	Steam 12000 H. P.	Standard Oil Co. of N. J.	(1)	11500
do	155 to 159	Cargo Vessel 435'x63'x31'6"	Steam 6000 H. P.	U. S. Maritime Comm.	(5)	7400 ea.
do	162 to 167	Cargo Vessel 465'x69'6"x33'6"	Steam 8500 H. P.	U. S. Maritime Comm.	(6)	8900 ea.
Ingalls Iron Works Co. Birmingham, Ala.	253 to 256	Cargo Vessel 465'x69'6"x33'6"	Steam 8500 H. P.	U. S. Maritime Comm.	(4)	8900 ea.
Lake Washington Shpyd. Houghton, Wash.	505	Survey Vessel 198'8"x38'x23'	Steam 2000 H. P.	Dept. of Commerce U. S. Government	(1)	1300
Moore Dry Dock Co. Oakland, Cal.	195-6	Cargo Vessel 465'x69'6"x33'6"	Steam 8500 H. P.	U. S. Maritime Comm.	(2)	8900 ea.
Newport News S.B. & D.D. Co., Newport News, Va.	369	Pass. Vessel 661'5"x93'3"x45'4½"	Steam 34000 H. P.	U. S. Lines Co.	(1)	24800
do	370-1-2	Oil Tanker 525'x75'x39'	Steam 12000 H. P.	Standard Oil Co. of N. J.	(3)	11500 ea.
do	373 to 376	Cargo Vessel 435'x63'x31'6"	Steam 6000 H. P.	U. S. Maritime Comm.	(4)	7400 ea.
do	379 to 384	Pass. Cargo Vessel 465'x69'6"x33'6"	Steam 8500 H. P.	U. S. Maritime Comm.	(6)	9200 ea.
Sun S.B. & D.D. Co. Chester, Pa.	177 to 180	Cargo Vessel 435'x63'x31'6"	Diesel 6000 H. P.	U. S. Maritime Comm.	(4)	7400 ea.
do	181	Oil Tanker 521'x70'x40'	Steam Elec. 6000 H. P.	Atlantic Refining Co.	(1)	11400
do	182 to 185	Cargo Vessel 465'x69'6"x33'6"	Diesel 8500 H. P.	U. S. Maritime Comm.	(4)	8900 ea.
do	186 to 189	Pass. Cargo Vessel 465'x69'6"x33'6"	Diesel	U. S. Maritime Comm.	(4)	9200 ea.
do	190	Oil Tanker 485'x68'x36'	Steam 9000 H. P.	The Texas Co.	(1)	9600
do	191-2	Seatrain 460'x63'6"x38'3"	Steam 8800 H. P.	Seatrain Lines, Inc.	(2)	8000 ea.
Tampa S.B. & Eng. Co. Tampa, Florida	33 to 36	Cargo Vessel 435'x63'x31'6"	Diesel 6000 H. P.	U. S. Maritime Comm.	(4)	7400 ea.
				TOTAL	69	584,850

Contract for Four C-1s to Consolidated Steel

The best news of the month for Pacific Coast shipbuilders is the announcement by the Maritime Commission that it has tentatively accepted the low bid of the Consolidated Steel Corporation, Ltd., Los Angeles, California, for the construction of four C-1 BT single screw cargo ships. Bid was $1,890,000 for each of four ships on an adjusted price basis.

The ships are to be of the full scantling type, 416 feet long overall, 60 feet molded beam, and with a loaded displacement of 12,875 tons. They will be driven by a steam turbine of 4,000 normal shaft horsepower and will have a sustained sea speed of 14 knots. For complete description see lead article in this issue.

These vessels on completion will be allocated to the Pacific Argentine Brazil Line (McCormick) of San Francisco and will operate to the East Coast of South America.

Formal award of this contract will not be made until the Commission disposes of the low bid made by the Tampa Shipbuilding and Engineering Company of Tampa, Florida, either by acceptance or rejection.

The Consolidated Steel Corporation, Ltd., will fabricate the steel for the four hulls in their huge steel plant at Maywood, California, and will assemble the ships on property leased from the Craig Shipbuilding Co. at Long Beach, California.

SHIPBUILDERS and ENGINEERS

BUILDING WAYS FOR WOOD AND STEEL CONSTRUCTION

Three Plants

OAKLAND PLANT
Dry Dock and Machine Shop
Dry Dock cap.: 12,500 tons
Length 450 feet
FOOT OF FIFTH AVENUE
Tel.: GLencourt 3922

SAN FRANCISCO OFFICE AND PLANT
Machine Shop
and
General Repairs
1100 SANSOME STREET
Tel.: SUtter 0221

ALAMEDA PLANT
Two Dry Docks
3,000 tons and 5,000 tons
capacity
FOOT OF SCHILLER STREET
Tel.: ALameda 0533

GENERAL ENGINEERING and DRY DOCK COMPANY

Bethlehem Low on Three Ships for Seas Shipping Co.

On August 1 the U. S. Maritime Commission opened bids on three ships for the account of the Seas Shipping Company, operators of the Robin Line between New York and ports of South and East Africa. These vessels are to be from designs by George Sharp, N. A., calling for a length of 485 feet, a beam of 66 feet and a draft of 27 feet, with a displacement loaded of 15,200 tons. They will have 6,000 shaft horsepower and a sustained sea speed of 15½ knots.

Bids were for each of three ships:

Steam drive, fixed price—Sun, $2,604,000; Bethlehem, $2,300,000; Federal, $2,505,000.

Steam drive, adjusted price—Sun, $2,403,000; Bethlehem, $2,250,000; Federal, $2,327,000.

Diesel drive, fixed price—Sun, $2,533,000; Bethlehem, $2,504,000.

Diesel drive, adjusted price—Sun, $2,354,000; Bethlehem, $2,454,000.

It is a rather interesting feature of bidding for vessels to be constructed under the Merchant Marine Act of 1936 that Bethlehem is consistently low bidder on ships designed by commercial naval architects for commercial shipowners.

Naming the Delta Line Ships

According to an announcement issued by N. O. Pedrick, president of the Mississippi Shipping Company, names have been chosen for the three new vessels now under construction at Sparrows Point yard of the Shipbuilidng Division of the Bethlehem Steel Company to be used in the Delta Line service.

The first vessel will be launched December 16, 1939, and will be named Delbrazil. The second and third launchings will be early in 1940 and these ships will be christened Deltargentino and Delorleans.

Scheduled delivery dates are: Delbrazil, June 1, 1940; Deltargentino, September 1, 1940; and Delorleans, December 1, 1940.

Tentative arrangements have been made to have Miss Alzira Vargas, daughter of the President of Brazil, christen the Delbrazil.

An Interesting River Towboat

Commercial Iron Works of Portland, Oregon, are building a very interesting river towboat for the Columbia-Snake River Towing Company to the designs of L. H. Coolidge, naval architect of Seattle. This boat has tremendous power for her size in order to negotiate the swift currents of the Snake River.

She will be 90 feet long by 25 feet beam and will operate on 36-inch draft. A six-cylinder 12" x 15" directly reversible Enterprise diesel engine will drive each of her twin screws. She will be of tunnel stern construction.

Dredge Chester Harding

(Continued from page 29)

companionway and instrument panel. On the flat black instrument panel there is installed the Fathometer, electric draft indicator, watertight door control, clinometer, whistle gage, Sperry alarm, telltale light control and general alarm switch. All of these devices have black dials and white marking to minimize light glare.

On the port side of the chart room interior communication is centralized in a stand which supports the sound-powered telephone, talk-back loud speaker selector switches and speaking tubes.

On the bridge proper there are three engine telegraphs, two remote searchlight controls, an electric Sperry steering control, Sperry repeater, microphone jack boxes and a magnetic compass. A large metal chart table and settee are in the center of the chart room.

A modern feature which has attracted considerable attention is the use made of the 18 inch Carlisle Finch serachlights as media for directional ship-to-ship loud speaker talk-back through Guided Radio Corporation speakers, which surmount each searchlight, a tell-tale being extended through the bridge deck-head so that one may see how the remotely controlled searchlights face during daylight hours. Through the use of this equipment it is possible to carry on conversations at a distance of two thousand feet. This corporation's speaker system also has units at each hopper, at the engine room control station and over the after deck. The amplifier and converter are made accessible on the bridge deck in a steel locker. Through this system the hopper operating and ship handling orders are directly issued from the bridge with all the potentialities of quick oral response from the crew at the several stations.

Hull and equipment were built to American Bureau classification rules and the dredge is provided with a certificate from the Bureau of Marine Inspection and Navigation.

No pains have been spared in her finish and outfitting, which includes a large inventory of spare parts in all departments, even to reels of electrical cable representing 10 per cent of all sizes of all wiring in the ship. Other systems and equipment include: an oil burning Webb Perfection galley range; York refrigeration; CO-Two fire extinguishing systems; electrical welding machine; dough mixer; potato peeler; electric coffee urns; refrigerated drinking-water fountains; sounding machine; copper fin type radiators throughout; mechanical ventilating systems for the crew's quarters and lavatories; and a complete machine shop in the upper engine room flat, consisting of a large lathe, shaper, radial drill, grinder, hack saw and pipe cutting machine. Type plans for Chester Harding and her construction specifications were prepared in the office of the Chief of Engineers, U. S. Army, at Washington, D. C., by the Marine Design Section in charge of Major H. B. Vaughan, Jr. The contract for the ship's construction was awarded to the Pusey and Jones Corporation in February, 1938, and amounts to approximately $1,850,000.00. Laid down in May of the same year, the launching took place on January 20, 1939. After delivery the ship becomes a part of the fleet now operated by the New York District Engineer.

Pocket Size CO_2 Indicator

The Fyrite CO_2 indicator.

Bachrach Industrial Instrument Company, Pittsburgh, Pa., has just announced a new pocket-size CO_2 indicator, tradenamed "Fyrite," specifically designed for heating dealers and service men. It is accurate, inexpensive, easy and quick to operate and practically nonbreakable.

An entirely new principle makes this indicator unique in simplicity of use and fool-proof operation. There are no valves, no clamps, no leveling bottle to manipulate. A complete analysis takes less than twenty seconds.

Advanced design, careful selection of suitable materials, modern manufacturing practices, and generous investment in tools, dies and molds make it possible to accomplish remarkably high accuracy and durability, yet to sell the "Fyrite" at low price.

Operation is extremely simple. A dozen strokes of the aspirator bulb fills the gas chamber with the flue gas to be analyzed. The sampling hose is then detached, which automatically seals the "Fyrite" and makes it ready for the analysis. To mix the gas with the absorption fluid the "Fyrite" is turned upside down, then back again to its normal position. This takes about ten seconds. The suction created due to the complete absorption of the CO_2 pulls the absorbing fluid up in the graduated tube an amount directly proportional to the CO_2 absorbed.

No setting up is required. The indicator as received is ready for immediate use.

The Thomas A. Short Co. of San Francisco is representative for Northern California.

Dependable Insurance Since 1863

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FIREMAN'S FUND GROUP

Fireman's Fund Insurance Company ~ Occidental Insurance Company
Home Fire & Marine Insurance Company
Fireman's Fund Indemnity Company ~ Occidental Indemnity Company

Strength Permanence Stability

New York · Chicago · SAN FRANCISCO · Boston · Atlanta

Beachcomber's Loot

Some "Un-pertinent" Sea and Ship Lore

● Going Down to the Sea

The newest liner contains a smoking room in the style of a 16th century farmhouse with a tiled floor. I hope the illusion is complete, and that, on emerging from this room, the passenger skirts a byre and proceeds to his cabin by way of a meadow well stocked with cardboard cows.

Everything is done nowadays to persuade passengers to believe that they are not really at sea. The only trouble is that indiscreet fools insist on coming out on deck now and then and the sight of the sea gives the whole show away.

You forget at once the Abyssinian Dance Hall, the Chaldean Lounge, the Assyrian Playground, the Babylonian Health Deck, the Phoenician Radioactive Vita Glass Rest Hall, the Neo-Hittite Beauty Deck, the Armenian Salon, the West African Ballroom, and all the other comforts and delights of those who go down to the sea in hotels.—Beachcomber in the Daily Express.

● Names of C-2s Launched

The U. S. Maritime Commission, acting under a very commendable desire to arouse the ship-mindedness of the United States, are naming their C-2 type cargo vessels for famous Clippers of the glorious era of sail. This program has been somewhat altered through the decision of the Moore-McCormack Company (who are taking over the C-2 motorships built at the Sun Yard) to name their vessels with their Mormac designation, as Mormachawk, Mormacwren, and so on.

To date six C-2s have been christened for old sailing ships, as follows: Donald McKay, Nightingale, Challenge, Red Jacket, Stag Hound and Lightning. We herewith append thumbnail sketches of the story of each of these ships, with the comment of a great orator of the Clipper ship era: " 'All comparisons are odious,' but what will we say when men compare a vessel whose propulsion depends on the Fires of Hell with that glorious, lively ship which depends solely on the Breath of Heaven!"

Challenge: "Largest and longest merchant sailing vessel" built to that date was launched May 24, 1851, from the yard of W. H. Webb, New York. She was 224 x 43 x 24 feet, with a tonnage of 2006 at her load draft of 20 feet. She had 42 in. deadrise and 36 in. sheer. The skysail pole on her main top was 230 feet above the keel. She would not have come in under the Golden Gate Bridge without shipping that pole. She was considered among most beautiful and best equipped of American Clippers, but her history is nearly all misfortune, either with weather and/or crew and/or sickness. Gales or calms, mutinies or epidemics always prevented her from making coveted records. She was sold to British flag service in 1861 and was lost on the coast of France in 1876.

Donald McKay. Launched in 1855 at yard of Donald McKay, East Boston, she was: 266 feet long between perpendiculars; 46 feet 3 inch beam; 29 feet 5 inch depth of hold; and 2614 tons gross measurement. With the exception of Clipper ship Great Republic, she was for many

MARINE DEPARTMENT
AETNA INSURANCE CO.
QUEEN INSURANCE CO.
MARITIME INSURANCE CO., LTD.
FIDELITY PHENIX FIRE INS. CO.
Commercial Hull Dept.
AUTOMOBILE INS. CO.

MATHEWS & LIVINGSTON
Marine Underwriters
200 BUSH ST. SAN FRANCISCO
Offices at: Colman Bldg. - Seattle 111 West 7th St. - Los Angeles

years the largest sailing ship afloat. She was built for the Black Ball Line of Liverpool—Australian packets operated by the British firm of James Baines and Co., and never sailed under the Stars and Stripes, except on her delivery voyage across the Atlantic. During one 24-hour run on that voyage she made 421 nautical miles. She was in the Australia service for 13 years, then six years in general service out of Liverpool, then four years as a British Army flag troop and supply transport. Then in 1879 she was sold to the German flag with home port at Bremerhaven. She ended as a coal hulk at Madeira.

Nightingale. Designed and built by Samuel Handscomb, Jr. Launched at his yard, Portsmouth, N. H., on June 16, 1851. Acknowledged one of the most beautiful ships afloat.

Long history as an American merchant ship. In 1861 had a slave-carrying interlude of 9 months to 1 year. 1876 sold Norwegian flag. Abandoned at sea in 1893.

Red Jacket. Celebrated for her beauty of line and proportion. She was 251 feet 2 inches by 44 feet by 31 feet, and 2305 tonnage measure. Modeled by Samuel H. Pook and built by George Thomas at Rockland, Maine. Launched November 2, 1853. Her maiden voyage across Atlantic was 13 days, 1 hour, 25 minutes, New York-Liverpool dock to dock, a record that stands to this day for sailing ships. Chartered for round voyage Liverpool-Melbourne by White Star Line. Her time, 19 days Meridian of the Cape to Melbourne has never been equalled under sail. She was sold to White Star Line to go under British flag at end of first round voyage, November, 1854.

Stag Hound. Launched December 7, 1850, by Donald McKay, East Boston. Length B. P. 215 feet; beam 39 feet 8 inches; depth 21 feet. Tonnage 1534 O. M. Burned at sea October 21, 1861, about 45 miles south of Parnambuco.

First round voyage, New York, San Francisco, Manila, Whampoa, New York, paid for the ship and divided among the owners a clear profit of $80,000 net earned in 10 months, 23 days.

Lightning. Built by Donald McKay, East Boston, for James Baines and Co. Finished January 3, 1854. 244 feet by 43 feet by 23 feet; 2083 tons.

Only voyage under American flag, the delivery trip across the Atlantic. Undoubtedly the world's fastest sailing ship. 436 nautical miles in 24 hours; 2188 miles in a week; 5244 miles in 18 days; 18.16 knots average for 24 hours.

We doubt if her steamer namesake will ever sustain that speed for 24 hours.

"Requiescat in pace."

On the Pacific Range

METCALF OF UNION OIL

Lester G. Metcalf, Union Oil Company's manager of marine operations, and former manager of refineries, is a graduate of Pomona College, where, in addition to an excellent scholastic record, he established an enviable reputation as an outstanding performer on the gridiron. . . He is also a graduate of Massachusetts Institute of Technology.

"Met," as he is familiarly known, began his work with Union Oil as an engineer in the Northern Pipe Line Division 25 years ago. . . Leaving the company for a short time to engage in other activities, he returned in 1917 to assume the position of refinery engineer at the company's Oleum plant, and was shortly thereafter the victim of another interruption when he was summoned for active duty during the war. He returned after 18 months in the army, however, and has been able to maintain an unbroken record since that time.

By 1920 Mr. Metcalf had already shown in a marked degree the managerial ability that finally carried him to positions of high responsibility in the company, and in that year was appointed superintendent of the Oleum refinery, a position he retained until 1926 when he was moved to Los Angeles as assistant manager of refineries. Four years later he was elevated to the post of manager of refineries, and eventually became manager of manufacturing. His control of the company's marine affairs began with the recent retirement of William Groundwater.

"Met" is a strong, virile type of individual, with an inexhaustive supply of energy and an unusual intensity. . . He is actively interested in a wide variety of sports, and derives real enjoyment from participation in the company golf, tennis, bowling, and rifle contests. He is also an enthusiastic member of the Los Angeles Yacht Club, and for many years has devoted himself to the promotion of small boat events and outings for the younger members of the club. He is chairman of the committee that arranged the national Snipe boat races at Los Angeles Harbor on August 25, 26, and 27, and in which his own children, Darby and Barbara, competed for the national championship.

Lester G. Metcalf

Harold S. Schuler

NEW MANAGER

Appointment of **Harold S. Schuler** as Pacific Coast district sales promotion manager of the Westinghouse Electric and Manufacturing Company is announced by William R. Marshall, vice president of the company.

Mr. Schuler was formerly a division manager of the Apparatus Advertising Department at the East Pittsburgh, Pa., headquarters of the company. Before joining the Westinghouse organization in 1937 he was associated with the Gulf Oil Corporation and the York Ice Machinery Corporation, and had been an account executive with Ketchum, MacLeod and Grove, Inc. in Pittsburgh.

G. P. COMMODORE

Captain Herman Hopner, retired commodore of the General Petroleum Corporation's tanker fleet, passed away in Santa Monica on August 22. . . For nearly twenty years a master of General Petroleum tankers, Captain Hopner's last command was the Tejon. . . He was 72 years old.

ALASKA S.S. CO.

L. W. Baker will be general manager of the Alaska Steamship Company, effective September 1. . . This is announced by **Lawrence Bogle**, vice president of this famous line. . . Mr. Baker succeeds **Charles Bocking** who recently resigned. . . Resident of Seattle since 1905 the new "G-M" entered the steamship business in 1914 with the Pacific Alaska Navigation Company, the original Admiral Line. . . In 1921 he joined the Alaska Steamship organization, a year later receiving the post of assistant general freight and passenger agent. . . By 1926 he was named general "FPA". . . In 1933 he was traffic manager and five years later was appointed assistant general manager.

The Propeller Club of the United States

The Port of Los Angeles

Port No. 66
Chartered July 26, 1939
President:
RALPH J. CHANDLER
Matson Navigation Company
First Vice President
F. A. HOOPER
American-Hawaiian S.S. Company
Second Vice President:
EDGAR M. WILSON
American President Lines, Ltd.
Third Vice President:
MORGAN HUNTOON
Swayne & Hoyt, Ltd.
Secretary-Treasurer:
DAVID LIVINGSTON
Chamber of Commerce,
1151 South Broadway

BOARD OF GOVERNORS

ONE YEAR TERM
(Expiring 1940)

D. J. BAKER, G. F. A.,
Panama Pacific Line,
715 West 7th Street,
Los Angeles, Calif.
CAPT. H. H. BIRKHOLM,
Vice President,
General Steamship Corp.,
541 South Spring Street,
Los Angeles, Calif.
THOMAS FORSTER,
General Superintendent,
Bethlehem Steel Company,
East San Pedro, Calif.
D. N. LILLIVAND,
Manager,
Grace Line,
523 West 6th Street,
Los Angeles, Calif.
LLOYD RICHARDS,
Manager,
Sudden & Christenson,
111 West 7th Street,
Los Angeles, Calif.
HAROLD C. SMITH,
Vice President,
Williams, Dimond & Co.,
621 South Hope,
Los Angeles, Calif.

TWO YEAR TERM
(Expiring 1941)

J. L. ADAMS,
Attorney,
Lillick, McHose & Adams,
634 South Spring,
Los Angeles, Calif.
J. B. BANNING, JR.,
General Superintendent,
Matson Navigation Company,
723 West 7th Street,
Los Angeles, Calif.
DAN DOBLER,
Marine Superintendent,
The Texas Company,
P. O. Box 755,
Wilmington, Calif.
J. L. HOOK, JR.,
Manager,
McCormick Steamship Company,
601 West 5th Street,
Los Angeles, Calif.
EUGENE MILLS,
President,
Crescent Wharf & Warehouse Co.
Berth No. 233,
San Pedro, Calif.
CAPT. C. C. SPICER,
President,
Los Angeles Shipbuilding Co.,
811 West 7th Street,
Los Angeles, Calif.

THREE YEAR TERM
(Expiring 1942)

RALPH J. CHANDLER,
Manager,
Matson Navigation Company,
723 West 7th Street,
Los Angeles, Calif.
F. A. HOOPER,
Manager,
American-Hawaiian S.S. Co.,
530 West 6th Street,
Los Angeles, Calif.
MORGAN HUNTOON
Manager,
Swayne & Hoyt, Ltd.,
1151 South Broadway,
Los Angeles, Calif.
CAPT. C. S. McDOWELL,
Manager,
Consolidated Steel Company,
5700 South Eastern Avenue,
Los Angeles, Calif.
FREDERIC PIQUE,
Manager,
Hammond Shipping Company,
2010 South Alameda,
Los Angeles, Calif.
EDGAR M. WILSON,
Manager,
American President Lines, Ltd.,
108 West 6th Street,
Los Angeles, Calif.

Honorary President Arthur M. Tode of the Propeller Club of the United States has been on the west coast for the past two months conferring with the executives of the American shipping and marine interests, and cooperating with them seeking the expansion of the Propeller Club of the United States. Following preliminary conferences in San Francisco there was chartered under the laws of the State of California on June 3, the Propeller Club of the United States, Port of San Francisco. This is Propeller Club Port No. 65.

Thereafter conferences were held with the marine executives at Los Angeles culminating in an organization meeting held at the California Club on July 26 which resulted in the formation of the Propeller Club of the United States, Port of Los Angeles. This is Propeller Club Port No. 66. The national organization is gratified to have a Port located in the important shipping city of Los Angeles and to obtain the active cooperation of this group in the concerted effort being waged by us on behalf of the American Merchant Marine. From material that has been prepared by the Propeller Club, Port of Los Angeles, it will be observed that the ranking shipping executives are behind this movement. Their acceptance to serve as the officers and as members of the Board of Governors is an assurance of the serious purposes for which the club has been organized.

Plans are now being formulated by the Board of Governors of the Propeller Club, Port of Los Angeles, for the holding of the Charter Members luncheon at the Biltmore Hotel on Thursday, August 31. A large

Establishes New Port of Los Angeles

Ralph J. Chandler

attendance is anticipated including the shipping men from San Pedro, Wilmington and San Diego. At this time the charter will be formally presented to the Propeller Club, Port of Los Angeles.

Honorary President Arthur M. Tode of the Propeller Club of the United States will return for the meeting on August 31. He sailed on the S.S. Lurline August 4 for the Hawaiian Islands to assist in the organizing work and to attend a meeting for the presentation of a charter to the Propeller Club of the United States, Port of Honolulu, which will become Propeller Club Port No. 67.

Charter Members are Listed:

Adams, J. L.
Amar, Eloi J.
Arbogast, Glenn
Archbold, Fred G.
Argue, J. Clifford
Arthur, Jas. B.
Backus, L. T.
Bailey, Chas.
Baker, J. C.
Banning, J. B., Jr.
Barham, Guy B.
Beach, Maj.-Genl. Lansing
Beaton, Roy
Bell, Bernard E.
Bennett, Com. L. L.
Bennett, R. B.
Birkholm, Capt. H. H.
Black, Harold
Blanchard, Ben
Booth, C. S.
Braga, Earl W.
Brown, L. F.
Bruce, Roger
Brugman, C. King
Bryan, Wm. J., Jr.
Buckholtz, Thaddeus W.
Bull, Carl W.
Burns, R. D.
Byrnes, Lt. Com. Ray W.
Byrnes, W. J.
Cable, G. C.
Faries, David
Campbell, Ralph
Carr, Walter
Case, V. D.
Chandler, Chas.
Chandler, Ralph J.
Chantland, P. W.
Chapman, R. B. Hay
Chisholm, Wm. D.
Christianson, Chris
Clarke, James
Cluff, A. T.
Coffman, Capt. R. B.
Cragin, Ralph O.
Craig, James
Craig, John, Jr.
Curtis, Capt. Leb
Connor, L. H.
Corder, Fred H.
Daben, Roy
Dobler, Dan
Dodd, H. T.
Dorr, Harry
Dunnavant, Norman
Dupuy, Frank
Durkin, Owen
Earle, E. C.
Eicholts, Alvin
Eigle, W. N.
Elder, Horace
Eldridge, Arthur
Ellis, Ray L.
Fay, Joe
Ferguson, A. E.
Fitzgerald, Gerald
Fleming, David P.
Forster, Thos. B.
Frank, Lawrence
Gavin, Martin J.
Germain, P. H.
Gorman, Dr. P. J.
Gray, R. S.
Green, A. P.
Groundwater, Wm.
Guthrie, C. F.
Hancock, G. Allan
Harlow, S. S.
Harrington, W. A.
Hartry, Howard
Hauser, Capt. Max
Heinly, Bert
Henderson, D. G.
Henderson, Jo
Henderson, Capt. Robert
Hendricks, Overton
Hill, Capt. Robert
Hodges, S. A.
Hollinger, W. M.
Hollaway, Harvey
Hook, J. L., Jr.
Hooper, F. A.
Houghton, Chas. I.
Huber, Wm. X.
Hughes, Fred
Hughes, H.
Huntoon, Morgan
Hurd, J. B.
Ingoldsby, J. B.
Johnson, Bob
Jones, Chas. S.
Kelly, H. H.
Kelly, H. Richard
Koppel, Irving
Koppel, Leonard
Lamb, P. C.
Lawrence, Ted
Lee, W. O.
Leeds, Col. Chas.
Lillivand, D. N.
Livingston, David
Loudon, James
Lyman, E. D.
MacDonaugh, H. H.
MacMahon, E. A.
McComb, Hon. Marshall E.
McCourt, Robert L.
McDowell, Capt. C. S.
McGillivray, Capt. Wm.
McGowen, Francis J.
McGrath, John
McHose, John
McMillan, A. J.
Machris, Geo. L.
Machris, Maurice
Maddox, T. G.
Malseed, J. W.
Marshall, John
Matson, Clarence
Mattoon, Stanley
Mayo, Capt. C. B.
Measday, Walter
Menizies, Hubert
Messenger, A. P.
Metcalfe, L. G.
Miller, Nick
Miller, Otto
Mills, Eugene A.
Mills, Remington A.
Mitchell, Ray
Mitchell, Ray
Mitchell, T. T. H.
Moody, J. A.
Moore, Geo.
Munson, L. C.
Murray, J. J.
Nelson, E. R.
Neergaard, Hampton K.
Nichols, Ed
Nichols, Jos. F.
Niel, Geo.
Nicholson, Geo. F.
Nickerson, G. H.
Niner, Frank
Olafson, Stanley
Overton, Eugene
Osborne, C. R.
Page, C. A.
Parker, E. C.
Pauley, Edwin
Pegg, Albert O.
Peters, Capt. T. W.
Prevet, L. B.
Phillips, Don
Pickering, H. E.
Pique, Frederic C.
Reynolds, Emery T.
Richards, Lloyd R.
Richley, M. A.
Riedlin, Gus
Roethke, Wm.
Rosenfeld, Abe
Salter, Chas.
Selover, W. I.
Shine, Frank
Shroeder, Bill
Skolfield, G. L.
Smith, Harold
Smith, W. D.
Spicer, Capt. C. C.
Stewart, R. A.
Stewart, W. L., Jr.
Sullivan, Capt. Thos. L.
Summers, Harry
Sutherland, Geo.
Sweeney, Joe
Taylor, Reese
Thornton, Clyde
Vandernym, A. P.
Vermille, L. K.
Vigario, Earl
Vivelle, Walter
Webb, Torrey
Welch, Marion
Westigard, Wm.
Wickersham, Howard
Wickersham, W. H.
Wilkinson, Walter
Wilson, Andrew
Wilson, A. G.
Willson, E. A.
Wilson, Edgar
Woll, Arthur O.
Woodruff, A. L.
Wyman, Maj. Theo., Jr.
Yenney, C. F.
Young, Ed
Young, P. Banning
Zerwekh, Ed

The Port of San Francisco

Tirey L. Ford
President

Frazer A. Bailey
First Vice-President

Charles L. Wheeler
Second Vice-President

Joseph R. Sheehan
Third Vice-President

Eugene Hoffman
Secretary-Treasurer

BOARD OF GOVERNORS

Frazer A. Bailey
Capt. Henry Blackstone
John E. Cushing
Kenneth D. Dawson
Fred L. Doelker
Tirey L. Ford
Hugh Gallagher
A. S. Gunn
Edward H. Harms
George Jordan
Roger D. Lapham
Ira S. Lillick
Joseph A. Moore
Joseph R. Sheehan
Charles L. Wheeler

Plans for Programs

The newly organized Propeller Club of the United States Port of San Francisco will soon embark on a series of programs awaiting the official action of the Board of Governors.

The directors of the Club, we learn as we go to press, expect to hold a meeting during the last week in August in order to set up a permanent schedule for club luncheons, entertainment, and other functions. The new Port was established during the vacation season and it has been difficult by reason of the absence of executives and governors of the Club during the summer months to work out a definite plan. Exceptional interest has been created in the serious purposes and aims of the recently chartered outpost of the National Club and it is anticipated that Fall programs will witness record-breaking attendance.

The fifteen directors and officers with the single exception of President Tirey L. Ford, absent because of illness, met in a body and occupied a special table in attendance at the luncheon on Monday, August 21, honoring Admiral H. E. Yarnell at the Commercial Club in San Francisco.

I am delighted to learn of the organization of a Propeller Club at the Port of San Francisco.

It should prove a valuable acquisition to the Port of San Francisco and I am pleased to extend congratulations and best wishes to the officers and members of the Club. The personnel of your membership, consisting as it does of outstanding citizens interested in the American Merchant Marine, gives every assurance of the success of your undertaking.

With every good wish,

Sincerely yours,

DAVID I. WALSH,
Chairman, Comm., Naval Affairs.

The Port of Honolulu Makes Bow!

Latest Propeller Club unit established by the Propeller Club of the United States is the Port of Honolulu chartered August 15 after the August visit of **Honorary President Arthur M. Tode.**

First news of the new organization reaches Pacific Marine Review as we go to press. In welcoming the new Port into the national group, **Charles H. C. Pearsall,** president of the Propeller Club of the United States, comments:

"It is with great pleasure that we welcome Port No. 67 . . . Honolulu, T. H. . . . officially chartered at a luncheon held at the Royal Hawaiian Hotel on August 15, and attended by the officers and the Board of Governors. From Alexandria, Egypt, to Honolulu, Hawaii, Propeller Clubs now extend more than half way around the world!"

Mr. Pearsall states that the Board of Governors have extended 250 invitations to leading maritime men of Hawaii to attend the Charter Presentation Dinner on August 25. Included as distinguished guests invited for the occasion are **Honorable Joseph B. Poindexter,** Governor, Territory of Hawaii; **Honorable Samuel W. King,** Hawaiian Congressman; **Mayor Charles S. Crane; Rear Admiral Orin G. Murphin, U.S.N.;** and **Major General Charles D. Herron, U.S.A.**

Mr. Tode received a royal welcome at Honolulu aboard the S.S. Lurline. His maritime friends at the Port met him with the encouraging news that Honolulu was "all set" for the inauguration of the new Propeller Club . . . and a few days later the organization meeting was staged.

New president of the Port of Honolulu is **James L. Friel,** Harbor Master. First vice president is **Randolph Sevier,** Castle & Cook, Ltd. **Henry W. Deas** of Norton-Lilly & Company is second vice president, and **Frank E. Thompson, Jr.,** of Hawaiian Sales Factors, is secretary-treasurer.

The Board of Governors for the term expiring 1941 are:

COMMANDER GORDON T. FINLAY,
United States Coast Guard,
Aloha Tower,
Honolulu.

M. W. MITCHELL,
General Passenger Agent,
Inter-Island Steam Navigation Co., Ltd.,
Honolulu.

EARL M. THACKER,
President, Thacker Transportation Co., Ltd.
Dillingham Building,
Honolulu.

STANLEY H. WALDRON,
President, F. L. Waldron, Ltd.,
Fort and Queen,
Honolulu.

JOHN A. YOUNG,
President, Young Brothers, Ltd.,
Pier No. 21,
Honolulu.

(Term Expiring 1942)

G. C. BALLENTYNE,
Manager, The Hawaiian Freight Association, Ltd.,
Pier No. 11,
Honolulu.

M. B. CARSON,
Vice-President,
Inter-Island Steam Navigation Co., Ltd.,
Fort and Merchant,
Honolulu.

C. G. HARRINGTON,
Manager, Standard Dredging Co.,
Pier No. 9,
Honolulu.

FRANK C. PALMER,
Hawaiian Pineapple Company, Ltd.,
Iwilei Road,
Honolulu.

LESTER PETRIE,
Oahu Railway & Land Company,
Iwilei Road and King Street,
Honolulu.

(Term Expiring 1943)

HENRY W. DEAS,
Manager,
Norton, Lilly & Company,
Dillingham Building,
Honolulu.

JAMES L. FRIEL,
Harbor Master,
Aloha Tower,
Honolulu.

JAY J. MURPHY,
Manager,
American President Lines, Ltd.,
Dillingham Building,
Honolulu.

RANDOLPH SEVIER,
Castle & Cooke, Ltd.,
Bishop and Merchant,
Honolulu.

FRANK E. THOMPSON,
Attorney at Law,
Inter-Island Building,
Honolulu.

In extending their invitational announcement of the complimentary dinner to be tendered to the charter members at the Waialae Club, Waialae, on August 23, the Board of Governors comments:

"On this occasion the charter for the Propeller Club, Port of Honolulu, will be presented to the organization by Honorary President **Arthur M. Tode** of the Propeller Club of the United States. Mr. Tode has been actively identified with American shipping afloat and ashore, for nearly thirty years. A circumnavigator, with over one hundred countries visited, he is probably the widest-known individual in the United States in connection with the American merchant marine and its problems. Often referred to as the Ambassador of American Shipping, 'without portfolio,' he has a message of prime importance to us here in Honolulu."

Accompanied by Mrs. Tode, the days in the Islands proved very delightful to the visitors from the mainland. Mr. Tode is returning to the States during the latter part of this month of August at which time he expects to charter the Propeller Club of the California Nautical School. Still another Pacific Coast 'outpost' for the national organization is being planned and it is expected that we shall soon have a Port of Bellingham.

OAKLAND PORT COMMISSION

Three appointments to the Oakland port commission presented to the Oakland city council recently were ratified the middle of July, by the latter body, making the appointments effective immediately. **James E. McElroy**, chairman, was reappointed for a six-year term. **Claire V. Goodwin**, Oakland investment broker, was named to succeed **Ralph T. Fisher**, whose term expires. Mr. Fisher has been a member of the commission for twelve years and for a long time was chairman of the body. **Edward J. Smith**, Oakland attorney and former member of the State Legislature, was appointed to fill the vacancy created by the resignation of **Frank Colbourn** following the latters appointment as city clerk.

Mr. McElroy has been relected chairman of the port commission and **A. H. Abel** was also relected secretary. In addition, Mr. Abel is port manager.

Chairman McElroy, member of one of Oakland's pioneer families, one that has been associated with the development of Metropolitan Oakland for more than forty years, will continue to carry on in the capacity he was placed in when initially appointed. He has acted as expert advisor to the city in a number of important actions and also for numerous public utilities, and is recognized as an authority on Oakland industrial matters.

During the past six years of association with the commission, Mr. McElroy and the commission have engaged in considerable development work with the view of improving and increasing the facilities offered steamship lines, shippers, and also the public. Improvements made at Oakland Airport are also managed and operated by the port commission. The commission has doubled coverage space of docks and warehouses in the middle harbor, renewed many important leases, rebuilt Brooklyn Basin and made many other improvements.

Mr. Goodwin has been active in many Oakland civic affairs. He was educated in the Oakland public schools, graduated from the University of California, and is a veteran of the World War.

Mr. Smith, long a resident of Oakland, served as a member of the California State Legislature from 1922 to 1929. He was author of legislation permitting transfer from the State to the City of Oakland, for development purposes, all of the unimproved submerged tide lands bordering on the waterfront.

Secretary-Stenographer

A young lady . . . who has 14 years' experience in leading steamship offices as a stenographer . . . tells us that she wants a position with a San Francisco ship operating or shipping firm.

She has exceptionally good references and can take your dictation at rapid-fire pace.

Her last employer commends her in highest terms. Here's an opportunity for some executive to acquire a reliable, efficient assistant for those accumulating details. Address Box 821, Pacific Marine Review.

Propeller Club of California

News of the Month

A good turn-out is expected on the evening of August 24th down on Fishermen's Wharf when the Propeller Club of California joins hands with San Francisco's Marine Exchange at the gala observance of "A Night in San Francisco."

Lured by the offer of a chioppino feed with plenty of good old Italian vintages old-time Propellers will set their courses for the historic anchorage to participate in the big event.

The California club's share of the program is in the capable hands of E. J. Macfarlan, chairman of the program and luncheon committee. Notices are out over the signature of Secretary Stanley E. Allen piping all hands on deck "to entertain the Port Authorities of the Pacific." The group of P.A.'s is currently in session at Oakland . . . the occasion their annual coast conclave. The San Francisco celebration is timed for 6:30 p. m. and the port officials will make the trans-bay trip via the big bridge to join their hosts at pier 45.

NEW MEMBERS

Since our last itemization of new members the following Propellers have been added to the roster:

E. L. Binder, custom house broker and member of the firm of Hoyt, Shepston & Sciaroni.

Capt. H. A. Jeans of the General Steamship Corporation.

Jack Glen, importer and exporter.

Edwin Hoft, of Barrell and Company.

Capt. James Alger, Commandant of the United States Coast Guard.

IN MEMORIAM

Glen Hoffman, President of Tyler & Hippach Company.

● Charting the Course

The August mails carried a very comprehensive statement from the Board of Governors of the Propeller Club of California, addressed to the individual members outlining the present status of the organization which has an impressive record of accomplishments over the past decade.

The Propeller Club of California was founded back in 1929 and the succession of presidents over the years has included such well-known maritime figures as Ralph Myers, James A. Cronin, Joseph Dolan, Harry T. Haviside, Capt. Thomas A. Hunter, Edward H. Harms, Joseph J. Geary, Charles H. Robertson and the late Capt. Francis M. Edwards.

C. E. Finney is the incumbent president with Herman D. Nichols, vice-president.

Right ahead of summer vacationing and as a fitting climax to the January to June programs of the Propeller Club of California, the annual graduation ceremonies of the California Nautical Schoolship were sponsored by the organization.

The exercises were staged on Treasure Island where the schoolship was berthed—and where hundreds of visitors came aboard for inspection of the vessel's shipshape deck and engine room facilities.

The graduation of the C.N.S. cadets was the usual impressive event. Chairman of the program acting for the Propeller Club of California was **Capt. Cyril Meek** who headed up the committee handling the many details.

Guest speakers were **Joseph R. Sheehan,** president of American President Lines and **Walter J. Walsh,** who for the past several years has served as general chairman of the annual observance of Navy Day in San Francisco.

Prizes awarded meritorious cadets in the two departments of the schoolship's curriculum were assembled with the assistance of local steamship operators.

KOPPERS

C. D. Marshall, chairman of the Executive Committee of the Board of Trustees of Koppers United Company, resigned on July 24, and the Executive Committee elected **J. T. Tierney** to this position. Mr. Tierney continues as president and Mr. Marshall retains his membership on the Board.

Mr. Tierney will also be chairman of the Board of Koppers Company, resigning his position as president of this principal operating unit of the Koppers organization, in which position he will be succeeded by **J. P. Williams, Jr.,** who for some years has been vice president of Koppers United Company and president of The Koppers Coal Company. Mr. Williams will serve also as executive vice president of Koppers United Company.

McCORMICK MEN

J. L. Hook, Jr., Southern California district manager; **John Barthrop,** district freight agent at Seattle; **William Moore,** assistant to the Northwest manager, and **Charles Rudberg,** terminal agent at Portland, all of the McCormick Company, were in San Francisco last week conferring with company officials.

FOR NEW SHIPS

Harry Toumey, head of Toumey Electric & Engineering Co., San Francisco, has made another shipment of Plant-Mills direction indicators and engineer's alarms to Eastern shipyards for installation in vessels under construction. The orders were received through Williams, Dimond & Company of San Francisco, general agents for these products.

OAKLAND FOREIGN TRADE

The Oakland Foreign Trade and Harbor Club for their September 7th meeting, at the Hotel Coit, will have as their guest speaker, W. F. Minehan, Assistant Vice President, International Banking Department, Bank of America, who will address the meeting on the subject: "Following the Sun with Foreign Exchange Traders."

PLANT EXPANDING

Earle Atkins, sales manager of Chiksan Tool Co. of Brea, Califoria, manufacturers of Chiksan ball-bearing swing joints for handling iquids, gas and a wide variety of hemicals, recently visited the San Francisco-Oakland territory. . . The Chiksan organization is expanding ts manufacturing facilities.

AMERICAN-HAWAIIAN

Lewis Lapham, chairman of American-Hawaiian Steamship Company's invitational golf tournament, announces the Eighth Annual Classic is scheduled for Sunday, September 17. . . The place, La Rinonada Golf Club, one mile north of Los Gatos, California. . . **Lou Shain** is receiving entries and **John Pruner** declared the prize awards will be the grandest in the event's history. . . Special handicap adjustments are under way.

VETERAN PASSES

George Bourne, personnel manager for Matson Navigation Company, aged 53, passed away August 7 in Oakland. . . A steamship man of many years experience, Mr. Bourne is missed by friends hroughout West Coast shipping circles. . . Services were held at the Little Chapel of the Flowers in Berkeley.

TO SEATTLE

Preston Faller, for four years San Francisco district manager for **Clark Tructractor,** Battle Creek, Mich., and formerly associated for eleven years with the Clark district office at Houston, Texas, has assumed charge of the Clark Northwestern office, Seattle, Wash., and will serve Washington, Idaho, Montana, Manitoba, Saskatchewan, Alberta, British Columbia and Alaska.

He is succeeded in the San Francisco office by **Glen L. Codman. Robert H. Braun,** Clark California district sales manager, has established new headquarters in Los Angeles.

CORRECTS RIPLEY

Abe Marks, retired manager of the Marine Exchange and one of the Nation's foremost authorities on the history of American ships and shipping, has corrected Robert "Believe It or Not" Ripley. Says Abe:

"Noticed Ripley's script of 21st stating ferry Multnomah made longest tow from Portland to Honolulu. I can beat that. Many years ago the steamer Zealandia, towing the ferry Olmpia from Puget Sound to the East coast, steamed as far as the Straits of Magellan, where she grounded and became a total loss."

RADIO MEET

Message traffic and equipment sales in the marine radio field is showing a definite increase, according to Charles J. Pannill, president of the Radiomarine Corporation of America, who sailed in August on the S.S. Normandie to attend the annual meeting of the Comite Internationale Radio Maritime at Paris.

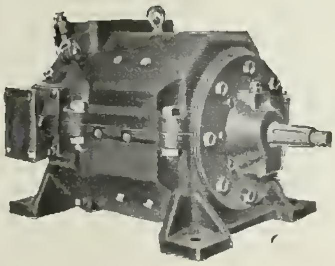
Mr. Pannill, who is executive vice president of the Comite, said that future business prospects for his company also were very promising, due in good part to a progressive program by American shipowners to provide their craft with the most modern type of communication equipment. Present plans for replacement, he said, should result in a substantial manufacturing activity by his organization well through 1940.

Among the classes of apparatus affected by this program involving some 750 American vessels is the romantic spark transmitter, which dates from the earliest days of radio communication and goes to its grave on January 1, 1940, by international agreement. Henceforth all ship equipment is to be powered by modern vacuum tubes.

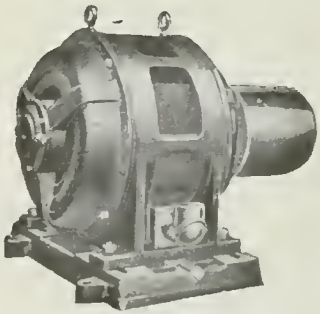
ELECTRO DYNAMIC WORKS

Marine and Industrial
MOTORS and GENERATORS

Alternating and Direct Current Motors are being continually furnished for deck and engine room auxiliary, hull ventilation, Diesel electric propulsion, etc., on Naval and Merchant vessels.



Direct current, cargo hoist and winch motor, designed especially for marine applications.



General purpose, alternating current, squirrel cage and slip ring types for industrial use.

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GArfield 2356

Pacific Coast
Sales and Service

ALBERT S. KNIGHT
3006 Western Avenue, Seattle

Necrology

P. A. S. FRANKLIN

P. A. S. Franklin, for more than a generation a leading figure in American shipping, passed away at his summer home in Locust Valley, Long Island, on August 14. He was 68 years old.

Mr. Franklin retired as chairman of the board of the United States Lines Company last January, turning over active management of the company to his son, John M. Franklin, who has been president since 1936, but he remained a member of the board and continued to act in an advisory capacity up to the time of his death.

During his entire career, Mr. Franklin's primary concern was to further the growth of a national merchant marine. To this vital cause he cotributed more than any other man in the course of a distinguished career.

Born in Ashland, Maryland, in 1871, he received his early training in Baltimore, where he joined the staff of the Atlantic Transport Company at the age of 18. The foundation of his later success in steamship operation was laid in that office under Bernard N. Baker, one of the notable American shipping executives of his day. He came to New York in 1901 as general manager of the Atlantic Transport Company and became its president in 1902. A year later he was made vice president of the newly-formed International Mercantile Marine Company; and in 1916, its president.

During the World War as a "dollar a year" man he rendered distinguished service to his country as a member of the shipping committee of the Council of National Defense. Later, as chairman of the Shipping Control Committee, he was director of American flag ocean cargo tonnage during the most crowded and crucial days of the war. Vessels under his jurisdiction were 1,400 in number, with a capacity of 7,000,000 deadweight tons — the largest fleet ever operated under a single executive direction. For this vital service to his country he later received the distinguished service medal. The French government also made him a chevalier of the Legion of Honor; and Belgium, a knight commander of the Order of Leopold.

For 12 years P. A. S. Franklin has built the largest American liners.

In 1926 he ordered three turbo electric liners, California, Virginia and Pennsylvania, which were the largest commercial vessels ever built in America.

The late
P. A. S. Franklin

Vale, Skipper

The Pacific marine field is mourning the passing of one of their picturesque old-timers. It is with sincere regret that we chronicle the death of Captain Alfred Pedersen . . . known to a host of marine men of the Seven Seas as "Stormy Pete."

Captain Pedersen's career as a ship master reflects the glory of the past and his succession of commands traces the history of ships over the past several decades.

Born in Norway, he came to the United States at the turn of the century, locating his residence in San Francisco which was his home port for the past 38 years. Some of his notable voyages were made on the historic U.S.S. Bear during the years of the Ocean Geographic Survey. He was skipper of the Cephana, one of the earlier Pacific Coast motorships; followed several years with the Admiral Line from which he joined the South African Line, where he was finally Commodore of their fleet.

Captain Pedersen was a Lieutenant Commander in the United States Naval Reserves.

His last command was the globe-circling Zaca . . . Templeton Crocker's yacht which has made interesting voyages in historical and educational research work.

Many a friend will read these lines with sorrow.

Vale, skipper!

Capt. Alfred
Pedersen

For true Economy
Let your buy-word be - - -

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MARINE PAINTS

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ON THE PACIFIC COAST

SEATTLE, WASHINGTON	A. T. B. Shiels, 108 West Lee Street
PORTLAND, OREGON	Chalmers Shipping Co., Board of Trade Building
SAN FRANCISCO, CALIF.	Pillsbury & Curtis, 100 Bush St.; KEarny 3302-3
SAN PEDRO, CALIF.	Robert S. Gardner, P. O. Box 231

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Here is a telephone designed for use at sea. It is powered by the speaker's voice alone. It's compact, rugged, built to withstand sea air and water, *waterproof*—ideal for emergency as well as routine use.

With this dependable telephone you can speak clearly to any one of five other locations on board. Send coupon for full details.

GRAYBAR ELECTRIC CO., Graybar Building, New York
Gentlemen: Please send me bulletin describing the new Western Electric 11A Voice-Powered Telephone.

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For fast, dependable service to *all* parts of the world, ship

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French Line

Main Office: 610 FIFTH AVENUE
(Rockefeller Center), New York
Freight Office: 19 STATE STREET, NEW YORK

Trade Literature

Chart on Oil Characteristics, published by Laucks Laboratories, Seattle, and Vancouver, B.C., for oil shippers who would like to have at their fingertips a concise and informative guide to oil classifications, hazards of transporting and methods of protecting oil cargoes, and pertinent facts as to the properties of oil.

In the early days of oil transport to the Northwest, when soy bean and tung oil came from the Orient in 5-gallon cans, Laucks' chemists and inspectors were on the docks sampling and analyzing it. As the volume of this oil shipped increased, and the use of ships' deep tanks evolved, Laucks Laboratories absorbed its share of the shippers' growing pains. During the long development to present-day methods of handling bulk oil, this Northwest firm was devising tests of ships' tanks for safety, cleanliness and tightness. Today, a 30-year record of service to Northwest shipping makes Laucks particularly competent to formulate this handy shippers' helper.

Copies are available upon request.

Worm Gears in Industry. The DeLaval Steam Turbine Company. The varied and numerous applications of worm gears in transmitting power from electric motors, water turbines and internal combustion engines to slow and moderate speed machinery of all kinds are illustrated by appropriate photographs.

The advantages of worm gear drive in the way of simplicity, smooth, silent operation, uniform and positive flow of power, standardization of electric motor speeds, saving in floor space, safety to attendants, and high efficiency, are explained, specifications given, and standard forms of such gears described.

Marine Diesel Engines. Worthington bulletin S-500-B32. An 8-page profusely illustrated booklet describing the vertical four-cycle direct injection marine diesel engine built by the Worthington Pump and Machinery Corporation in the 8" bore, 10½" stroke cylinder size trunk piston type, developing 25 horsepower per cylinder at 500 r.p.m. and available in units of from 2 to 6 cylinders, or 50 to 150 horsepower.

The engine is fitted: with a heavy duty reverse gear clutch, and thrust and steady bearing for direct connection to propeller shaft; and with all necessary auxiliaries, including circulating water pump, bilge pump, and air compressor for charging starting air tanks.

Trade Notes

Cargocaire Engineering Corporation has been formed to manufacture and render engineering service to Cargocaire equipment as licensees under the Colby-Colvin Cargocaire and other U.S. and foreign patents.

The organization comprises: Mark R. Colby, president; Oliver D. Colvin, vice president and chief engineer; J. S. Carswell, secretary; and Werner H. E. Hahne, research engineer.

Cargocaire is a newly-developed method and equipment for sweat prevention, fire detection, fire fighting, fumigation and aeration in ships' cargo holds. It was announced in a paper read before the 1938 annual meeting of the Society of Naval Architects and Marine Engineers. This paper was reproduced serially in Pacific Marine Review.

The interest in this new development was so great and so worldwide that this new corporation was formed to handle the business. Offices are maintained at New York and Seattle, and branch offices will be established in all principal ports. Four ships are being fitted with the system and many others are actively interested.

The Chiksan Tool Co., Fullerton, California, have recently appointed the **Crane Co.** as national distributors for the Chiksan line, including the famous Chiksan "Swing Joints" and Chiksan "Barge and Dock Hose."

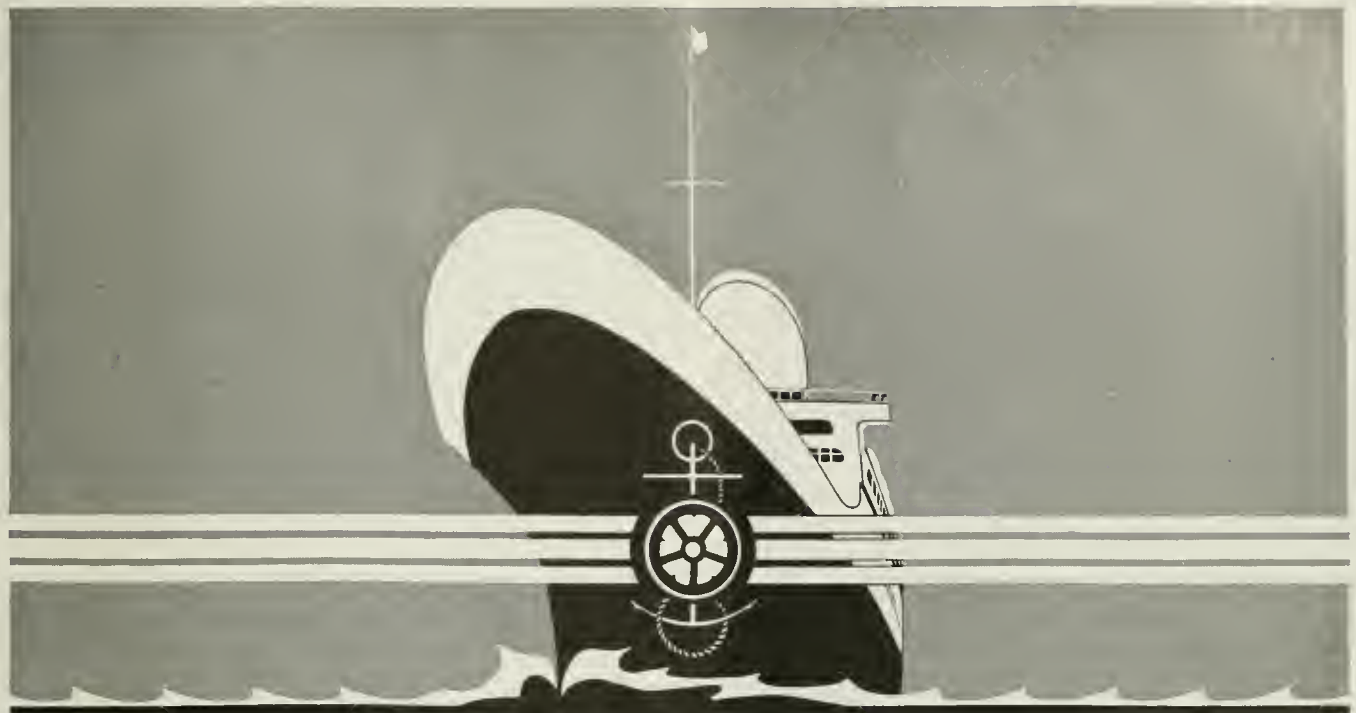
Chiksan Tool Co. will maintain its own staff of sales representatives in principal cities and in its sales and service organization in the oil fields to handle all steel rotary hose, circulating heads, disk bits, reamers, mud guns and other oil production specialties.

The nation-wide distribution facilities of Crane Co., in addition to the field representatives of Chiksan, assure prompt, intelligent sales service everywhere to all users of Chiksan products.

Social Security Under an Old Deal

The General Electric Company has on its pension rolls a retired employee who has been receiving a pension for more years than he had active service with the company. He is Frank Beute of Erie, Pa., now 89 years old, who was retired on a disability pension from the Schenectady Works on April 7, 1916, twenty-three years ago. He was first employed with the company on January 17, 1895, and at the time of his retirement was a machinist in the Contactor Control department. Thus his years of service totaled 21, while his time on the pension rolls has reached the total of 23 years. Mr. Beute lives with his son Albert in Erie, who has 41 years' service with the company.

Only one other similar case within the company has been noted. Mrs. Kate Wemple, who died June 13, 1939, at the age of 84 years, was manager of the office restaurant in Schenectady. Her active service totaled 20½ years and she enjoyed a pension for 24 years before she died. She was first employed in April, 1894, and was retired on May 1, 1915.



PUSEY AND JONES

Builders of steel ships for 87 years. . . . Wilmington, Delaware

"Compass Accuracy" in sea-going paints
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ASK THE NATIONAL LEAD MAN

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Pacific Coast

BETHLEHEM STEEL COMPANY, INC.

Shipbuilding Division
(Union Plant)
San Francisco

DRYDOCK AND ROUTINE REPAIRS: D. G. Scofield, H. M. Storey, Charcas, Peter Lassen, U.S.S. Enterprise, Knud Rasmussen, Vitus Bering, Brookdale, Baldhill, District of Columbia, Tug H. T. Haviside, Haviside Barge No. 4, Coya.

THE CAMPBELL MACHINE CO.

Foot of Eighth St.
San Diego, Calif.

DRYDOCK AND ROUTINE REPAIRS: Balboa, Cabrillo, Cape San Vincent, Olympia, Patria.

FELLOWS & STEWART, INC.

Wilmington, Calif.

DRYDOCK AND ROUTINE REPAIRS: 82 small yachts, motorboats and commercial craft.

GENERAL ENGINEERING & DRY DOCK CO.

Foot of Fifth Avenue
Oakland, Calif.

DRYDOCK AND ROUTINE REPAIRS: Oil S. Associates, Cutter Northland, Noyo, M.S. Hawaiian Standard, Barge S. O. Co. 4, Gas. S. Phoenix, Barge Bonita II, Dolphin II, Sea Lion, Sea Giant.

HARBOR BOAT BUILDING CO.

Berth 264, Fish Harbor
Terminal Island, Calif.

NEW CONSTRUCTION

Madeirense, tuna bait fishing vessel 125′ x 28′ x 14′; 500 gross tons; for Madeirense Inc., San Diego, Calif. 600 H.P. Fairbanks Morse main diesel engine; 3 auxiliaries, 450 total H.P.; 12 knots speed; cost $185,000; quick freezing refrigeration. Delivery date, November, 1939.

HONOLULU IRON WORKS

Honolulu, T. H.

DRYDOCK AND ROUTINE REPAIRS: U.S.C.G. Roger B. Taney, U.S.L.H.T. Kukui, U.S.S.R. Dredge Tisvinka, Yachts Seaweed and Nam Sang, U.S.S.R. Dredge Svir, U.S.S.R.M.S. Maxim Gorki, Yacht Dorade.

LAKE WASHINGTON SHIPYARDS

Houghton, Wash.

NEW CONSTRUCTION: 200 foot steam geared turbine steel survey ship Explorer for U. S. Coast & Geodetic Survey. Estimated delivery date January 1, 1940.

LOS ANGELES SHIPBUILDING & DRY DOCK CORP.

Los Angeles Harbor
San Pedro, Calif.

DRYDOCK AND ROUTINE REPAIRS: Warwick, Yacht Haida, La Placentia, M.S. New Zealand, Lebec, M.S. Bansiu Maru, Kingsley, Topila, M.S. Primero, Kalani.

MARE ISLAND NAVY YARD

Mare Island, Calif.

NEW CONSTRUCTION:

Swordfish, Submarine (SS193): keel laid October 27, 1937; launched April 1, 1939; commissioned July 22, 1939.

Tuna, submarine (SS203); keel laid July 19, 1939.

Gudgeon, submarine (SS211); order received for construction on June 2, 1939.

Fulton, submarine tender (AS11); keel laid July 19, 1939.

DRYDOCK AND ROUTINE REPAIRS: New Orleans, Philadelphia, Boise, Aylwin, Dale, Dunlap, Porter, Henley, Helm, Fanning, Craven, Brant, Boggs, Lamberton, Ortolan, Relief, Hamilton.

THE MOORE DRY DOCK CO.

Oakland, Calif.

NEW CONSTRUCTION:

Hulls Nos. 193, Walnut, and 194, Fir, two lighthouse tenders for Bureau of Lighthouses; LOA 174′ 10½″, beam molded 32′, depth 14′ 6″. Twin screw triple expansion engines; water tube boiler; 1000 horsepower. One for Pacific Coast; one for Great Lakes. Keels laid December, 1938; launched March, 1939; delivery dates August 24 and September 14, 1939, respectively.

Hulls Nos. 195 and 196, two cargo vessels for U. S. Maritime Commission; LOA 492′ 0″, LBP 465′, breadth molded 69′ 6″, depth molded 42′ 6″, SHP normal 8500, SHP max. 9350, dis. 17,600 tons, deadweight 11,926 tons; steam turbine propelled. No. 195, keel laid March 18, 1939.

DRYDOCK AND ROUTINE REPAIRS: Purse Seiner Nerenta-K, Santacruzcement, Pennsylvania, Mexican, Point Caleta, E. P. Ripley, Tug Sea Scout, Point Lobos, Thorsholm, Edwin Christensen, Kalani, Pomona, Alabaman, Barge Monitor, Tug A. H. Payson, Seattle, Point San Pedro, Selma City, Bengalen, Hanley, Carolinian, Slocum, Hawaiian, Midway, Kokkinati, Winona, Dakotan, Tacoma, Silverbelle, Kansan, R. J. Hanna.

THE PUGET SOUND NAVY YARD

Bremerton, Washington

NEW CONSTRUCTION:

Charles F. Hughes (Destroyer No. 428); standard displacement 1600 tons; order placed by Navy Department December 7, 1937. Keel laid January 3, 1939.

Monssen (DD436); keel laid July 12, 1939.

Woban (YT138).

Ala (YT139).

Ships authorized, work not started: Barnegat (AVP10), seaplane tender; Biscayne (AVP11), seaplane tender; Casco (AVP12), seaplane tender; Mackinac (AVP13), seaplane tender.

DRYDOCK AND ROUTINE REPAIRS: Salt Lake City, Pyro, Utah, Houston, Minneapolis, Astoria, West Virginia.

TODD SEATTLE DRY DOCKS, INC.

Harbor Island
Seattle, Wash.

DRYDOCK AND ROUTINE REPAIRS: Tug Active, Horace Luckenbach, Susan V. Luckenbach, Jacob Luckenbach, Minnesotan, Lena Luckenbach, West Ira, M.S. Acadia, W. R. Keever, Coloradan, Lewis Luckenbach, Tug Commissioner, El Capitan.

WESTERN BOAT BUILDING CO., INC.

2505 East 11th Street
Tacoma, Wash.

NEW CONSTRUCTION:

Hull No. 134, tuna clipper 90′ x 24′ x 13′; 275 H.P. Union Diesel. Launching date February 15, 1939.

Hull No. 136, purse seine fishing boat 96′ x 22′, powered by 240 H.P. Atlas Diesel engine. Keel laid January 30, 1939; launching date March 1, 1939.

Atlantic, Lakes, Rivers

AMERICAN BRIDGE COMPANY

Pittsburgh, Pa.

NEW CONSTRUCTION:

One relay barge 104′ x 34′ x 8′ for the Panama Canal. Delivery date January 1, 1940.

Twelve double deck covered barges 198′ x 35′ x 11′ for Mississippi Barge Line Co., St. Louis, Mo.

BATH IRON WORKS

Bath, Maine

NEW CONSTRUCTION:

Hull No. 171, DD410, Hughes, 1500-ton

CHAPTER XXII ON AMERICAN COMMERCE

TOBACCO

These tobaccos have been removed from casks in which they were aged for two years, in order to bring a finer flavor and enjoyment to the world.

Christopher Columbus discovered in the West Indies how the natives burned strange pungent leaves and inhaled the smoke. Rodrigo de Jerez, a sailor, returned to Spain boastfully smoking a tight roll of these same leaves, and the first thing he knew, was hurried away to prison for several years, "possessed of the devil" so his conviction read.

The early Virginia colony used tobacco even as currency. The industry succeeded where all others failed, and the foundation for the future growth of America was laid. Even to this day the snuff box is not without official standing in the United States. In the U. S. Senate stand two snuff boxes, one on the Democratic side and one on the Republican. Senate pages must fill these boxes twice a week.

Since colonial times tobacco has been one of America's greatest industries. In 18 different states, on more than 400,000 farms, employing over 1,000,000 men, tobacco is grown. In 1936 American tobacco factories created products valued at $1,200,000,000 and tobacco ranked third among our leading exports.

The McCormick Steamship Company annually transports tons of tobacco products between the Atlantic and the Pacific, Pacific Coastwise, and to the East Coast of South America. We are specially equipped to handle your products too, bulk or packaged, with care and dispatch.

4 ROUTES

McCORMICK STEAMSHIP COMPANY

461 MARKET ST., SAN FRANCISCO DOuglas 2561

Eastern offices: Philadelphia, New York, Baltimore, Pittsburgh, Norfolk, Chicago, Detroit, and Buffalo.

290 Vessels today

including the new Union Oil tanker "L. P. St. Clair", have eliminated mechanical boiler cleaning expense because their owners realize the value of the HALL SYSTEM OF BOILER WATER CONDITIONING.

The Hall Laboratories has earned the confidence and respect of every shipowner it is serving.

HAGAN CORPORATION

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Marine Insulation by Mundet

- LOW TEMPERATURE

For all refrigeration requirements be sure to have the protection of Mundet "Jointite" Corkboard and Moulded Cork Pipe Covering. This low temperature insulation gives dependable protection against heat infiltration. Economical, long-lasting, it is easily adaptable to individual requirements. Our engineering staff will be glad to help with specifications.

- HIGH TEMPERATURE

We carry a full line of the well known K & M asbestos and magnesia insulating products, manufactured by Keasbey & Mattison. K & M products assume highest efficiency and maximum power savings in high temperature operation. For full information on either low or high temperature insulation, write to the nearest Mundet office.

MUNDET CORK CORPORATION

SAN FRANCISCO - - - - - - 440 Brannan St.
LOS ANGELES - - - - - - 2051 East 37 St.

Distributors of Mundet Cork Insulation Products

SEATTLE - - - - Pioneer Sand & Gravel Co.
PORTLAND - - - Pacific Asbestos & Supply Co.

destroyer for U. S. Navy; contract date October 12, 1936; keel laid September 15, 1937; launching date June 17, 1939; delivery date September, 1939.

Hulls Nos. 177 and 178, DD423 and DD424, two 1620-ton destroyers for U. S. Navy. Contract date September 30, 1937; delivery dates April and June, 1940, respectively.

Hulls Nos. 180-181, DD429 and DD430; two 1620 ton destroyers for U. S. Navy. Contract dated August 15, 1938; delivery dates, December, 1940, and February, 1941, respectively.

Hulls Nos. 182-183, DD437 and DD438, two 1620-ton destroyers for U. S. Navy. Contracts dated June 15, 1939. Delivery dates June 15, 1941, and August 15, 1941.

BETHLEHEM STEEL COMPANY, INC.

Shipbuilding Division
Fore River Yard
Quincy, Mass.

NEW CONSTRUCTION:

CV7, Wasp, Airplane Carrier for U. S. Government; keel laid April 1, 1936; launched April 4, 1939.

Hull No. 1469, Cristobal; passenger and freight steamer for Panama Railroad S.S. Co.; 486 feet x 64 feet x 38 feet 6 inches; 16½ knot speed. Keel laid November 15, 1937; launching date, March 4, 1939.

Hulls Nos. 1470 and 1471, two 1500-ton destroyers for U. S. Government; delivery dates March, 1940 and May, 1940.

Hulls Nos. 1474, 1475, 1476 and 1477, four freight vessels for American Export Lines, Inc.; 450′ B.P. x 66′ x 42′3″; 16½ knots; geared turbines and water tube boilers. Keels laid, No. 1474, November 10, 1938; No. 1475, December 16, 1938; No. 1476, March 16, 1939; No. 1477, July 27, 1939. Launching date, No. 1474, July 18, 1939.

Hull No. 1478, Massachusetts; 35,000 ton battleship for U. S. Navy.

Hulls Nos. 1479 and 1480, two 6000-ton cruisers for U. S. Government.

BETHLEHEM STEEL COMPANY, INC.

Shipbuilding Division
Sparrows Point Yard
Sparrows Point, Md.

NEW CONSTRUCTION:

Hulls Nos. 4329, Platte, 4330, 4331; three 16,300 dwt. ton tankers for Standard Oil Co. of N. J.; 18 knots speed. Contract signed January 3, 1938. No. 4330, keel laid December 21, 1938. No. 4329 launched July 8, 1939.

Hulls Nos. 4337, Delbrazil; No. 4338, Deltargentino; and No. 4339, Delorleans; three passenger and cargo ships for Mississippi Shipping Co. Contract signed December 21, 1938. Keels laid, No. 4337, April 10, 1939: No. 4338, May 8, 1939. Launching date, No. 4337, December 16, 1939. Delivery dates, No. 4337, June 1, 1940; No. 4338, September 1, 1940: No. 4339, December 1, 1940.

Hull No. 4340, tanker for Union Oil Co. of Calif. Contract signed May 1, 1939. Keel laid July 18, 1939.

BETHLEHEM STEEL COMPANY, INC.

Shipbuilding Division
Staten Island Yard
Staten Island, N. Y.

NEW CONSTRUCTION:

Hulls Nos. 8001, Navajo; 8002, Seminole; and 8003, Cherokee—three U. S. Navy fleet tugs. No. 8001, keel laying date December 12, 1938; launching date August 17, 1939; delivery date February 15, 1940. No. 8002, keel laying date December 16, 1938; launching date September 15, 1939; delivery date April 15, 1940. No. 8003, keel laying date December 23, 1938; launching date October 14, 1939; delivery date June 15, 1940.

BOSTON NAVY YARD

Boston, Mass.

NEW CONSTRUCTION:

DD402, Mayrant, and DD403, Trippe, two light destroyers for United States Navy; LBP 334′, beam 35′6″ depth 19′8″; keels laid April 15, 1937; launched May 14, 1938; estimated delivery dates October 14, 1939, and December 14, 1939.

DD415, O'Brien, and DD416, Walke, two destroyers; LBP 341′, beam 36′, depth 19′8″; keels laid May 31, 1938; launching date September, 1939; delivery dates May 12, 1940, and July 12, 1940.

DD425, Madison, and DD426, Lansdale, two destroyers; 341′0″ x 36′0″ x 19′8″. Keel laying date December 19, 1938; launching date September, 1939; delivery dates August 30 and December 30, 1940.

DD433 and DD434, two destroyers, 341′0″ x 36′0″ x 19′8″, contract awarded July 23, 1938. Keels laid June 1, 1939; launching date February 1, 1940: completion dates March 1, 1941, and May 1, 1941.

DD441 and DD442, two destroyers; contract awarded May 29, 1939; completion dates July, 1941, and September, 1941.

BROOKLYN NAVY YARD

Brooklyn, N. Y.

NEW CONSTRUCTION:

CL 50, Helena, light cruiser; L.B.P. 600′ beam 61′7¾″, standard displacement 10,000; geared turbine engines; express type boilers; keel laid December 9, 1936; launched August 27, 1938; estimated delivery November 2, 1939.

BB 55, North Carolina, battleship; L.B.P. 714′ 0″, beam to outside armor 108′ 0″, std. displ. 35,000 tons; geared turbine engines; express type boilers. Keel laid October 27, 1937; estimated launching date March 1, 1940; contract delivery September 1, 1941; estimated delivery date October 15, 1941.

Battleship No. 61, order placed June 2, 1939; to be built under authority of Naval Appropriation Act for year 1940. Building period 49 months, beginning July 1, 1939.

CHARLESTON, S. C., NAVY YARD

Charleston, S. C.

NEW CONSTRUCTION:

One harbor tug, Massasoit (YT131); LOA 110′, beam 24′; authorized August 12, 1937; keel laid July 25, 1938; launched December 13, 1938; completed April 28, 1939.

One harbor tug, Heekon (YT141); LOA 100′, beam 25′; authorized July 7, 1938.

One harbor tug, Nokomis (YT142); LOA 100′, beam 25′; authorized July 7, 1938.

Six destroyers.

DD443 and DD444, authorized March 27, 1934.

DEFOE BOAT & MOTOR WORKS

Bay City, Mich.

NEW CONSTRUCTION:

Hull No. 166, sub-chaser PC-451, for U. S. Navy. Diesel driven; 170′ x 21′ 6″. General Motors engines; steel construction. Delivery date June, 1940.

THE DRAVO CORPORATION

Engineering Works Division
Pittsburgh, Pa., and Wilmington, Del.

NEW CONSTRUCTION:

Hull No. 1555, one welded steel auto barge 175′ x 30′ x 10′ 8″ for stock; 546 gross tons.

Hull No. 1567, one welded flush deck cargo box barge 100′ x 26′ x 6′ 6″ for stock; 165 gross tons.

Hulls Nos. 1569-1572, four welded flush deck cargo box barges 130′ x 30′ x 7′ 6″ for stock; 1000 gross tons.

Hulls Nos. 1573-1574, two welded steel coal barges 134′ x 34′ x 17′ for stock; 1534 gross tons.

Hulls Nos. 1575-1577, three welded steel oil barges 195′ x 35′ x 10′ for stock; 1833 gross tons.

Hulls Nos. 1578-1579, two welded steel coal barges 134′ x 34′ x 17′ for stock; 1534 gross tons.

Hull No. 1580, one 225 cu. yd. welded dump scow 115′ x 28′ x 7′ 6″ for stock; 120 gross tons.

Hull No. 1582, one welded steel dredge hull 72′ x 36′ x 5′ for Kosmos Towing Co., Louisville, Ky.; 118 gross tons.

Hull No. 1583, one welded steel derrick boat hull 60′ x 36′ x 7′ for American Construction Co., Cleveland, O.; 135 gross tons.

Hulls Nos. 1584-1593, ten welded steel coal barges 175′ x 26′ x 11′ O. A. for stock; 4720 gross tons.

ELECTRIC BOAT CORP.

Groton, Conn.

NEW CONSTRUCTION:

Hull No. 33, Seadragon (SS194); 1450 tons; keel laying date April 18, 1938; launched April 21, 1939; delivery date October, 1939.

Hull No. 34, Sealion (SS195); 1450 tons; keel laying date June 20, 1938; launched May 25, 1939; delivery date December, 1939.

Hull No. 35, Tambor (SS198); standard displacement 1475 tons; keel laying date January 16, 1939; delivery date August, 1940.

Hull No. 36, Tautog (SS199); standard displacement 1475 tons; keel laying date March 2, 1939; delivery date October, 1940.

Hull No. 37, Thresher (SS200); standard displacement 1475 tons; keel laying date May 15, 1939; delivery date December, 1940.

Hull No. 39 Gar (SS206); standard displacement 1475 tons.

Hull No. 40 Grampus (SS207); standard displacement 1475 tons.

Hull No. 41 Grayback (SS208); standard displacement 1475 tons.

Hull No. 42, Mackerel (SS204); standard displacement 800 tons.

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THE FEDERAL SHIPBUILDING AND DRY DOCK COMPANY

Kearny, N. J.

NEW CONSTRUCTION:

One destroyer, DD412 Hammann; keel laid January 17, 1938; launching date February 4, 1939.

Hulls Nos. 152 and 153, two tankers for Standard Oil Co. of New Jersey; keels laid July 15, 1938, and March 13, 1939. Launching date. No. 152, April 29, 1939. No. 152 delivered.

Hulls Nos. 155-159, five C-2 cargo vessels for U. S. Maritime Commission. Keels laid, No. 155, September 20, 1938; No. 156, January 3, 1939; No. 157, March 16, 1939; Nos. 158 and 159, May 26, 1939; launching dates, No. 155, May 20, 1939; No. 156, July 15, 1939.

Hulls Nos. 160 and 161, two torpedo boat destroyers for the United States Navy. Keels laid March 1, 1939.

Hulls Nos. 162-167, six C-3 cargo vessels for U. S. Maritime Commission. Keel laid, No. 162, May 8, 1939.

Hulls Nos. 168-169, two 6000 ton cruisers for U. S. Navy.

Hulls Nos. 170-171, two torpedo boat destroyers for the United States Navy.

LEVINGSTON SHIPBUILDING CO.

Orange, Texas

NEW CONSTRUCTION:

One twin screw tunnel-type shallow draft towboat; LOA 100', beam OA 24' 8¾", depth 7' 3"; powered with two 275 H.P. Atlas diesel engines; for Asiatic Petroleum Corp., N. Y., N. Y. **Delivery date August, 1939.**

One all welded towboat; LOA 80', beam OA 22' 7", depth 9' 6". Powered by 550 H.P. diesel. For W. G. Coyle & Co., New Orleans, La.

One all welded oil barge 75' x 25' x 5' for Cenac Towing Co., Houma, La. No machinery or other equipment. **Delivery date August, 1939.**

One all welded oil barge 173' x 39' x 8' 6" for Higman Towing Co., Orange, Texas. Two pumping units. **Delivery date August, 1939.**

One all welded diesel electric automobile and passenger ferry 185' 2½" LOA x 55' beam over guards x 15' 6" deep, for The Electric Ferries, Inc., NYC. Powered with 950 H.P. General Motors diesel with one 750 H.P. propelling motor.

MARYLAND DRYDOCK COMPANY

Baltimore, Md.

DRYDOCK AND REPAIRS:

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THE NEW YORK SHIPBUILDING CORPORATION

Camden, N. J.

NEW CONSTRUCTION:

One destroyer tender for U. S. Navy; order placed December 27, 1937. Launched May, 1939.

One seaplane tender for U. S. Navy; order placed December 27, 1937.

One destroyer tender for U. S. Navy; order placed October 14, 1938.

One seaplane tender for U. S. Navy; order placed October 14, 1938.

One battleship for U. S. Navy; order placed December 1, 1938. Keel laid July, 1939.

One repair ship for U. S. Navy; order placed July 20, 1939.

NEWPORT NEWS SHIPBUILDING & DRYDOCK CO.

90 Broad Street, New York

NEW CONSTRUCTION:

Hulls Nos. 363-364, two destroyers, Nos. 413, Mustin, and 414, Russell; keels laid December, 1937; launched December 8, 1938.

Hull No. 369, twin screw mail, passenger and cargo liner for United States Lines Co.; length 723', beam 92', depth 45'. Keel laid August 22, 1938; **launching date August 31, 1939.**

Hulls Nos. 370, 371 and 372, three oil tankers for Standard Oil Company of New Jersey; gross tonnage about 11,500 tons; L.B.P. 525', breadth molded 75', depth molded 39'. Keels laid, No. 370, January 16, 1939; No. 371, May 8, 1939.

Hulls Nos. 373, 374, 375 and 376, four single screw cargo vessels for United States Maritime Commission; turbine propulsion; gross tonnage, Nos. 373 and 374, about 7300 tons; Nos. 375 and 376, about 8000 tons; length 435', breadth 63', depth 40' 6". Keels laid, No. 373, November 14, 1938; No. 374, November 28, 1938; No. 375, March 6, 1939; No. 376, May 1, 1939. Launching dates, No. 373, April 28, 1939; No. 374; June 21, 1939.

Hull No. 378, battleship, 58, Indiana, for U. S. Navy.

Hulls Nos. 379, 380, 381, 382, 383 and 384, six single screw combination passenger and cargo vessels for U. S. Maritime Commission; length 465', breadth 69' 6", depth 42' 6", gross tonnage about 9100 tons.

Hull No. 385, aircraft carrier No. 8, Hornet, for U. S. Navy.

PORTSMOUTH, N. H., NAVY YARD

Portsmouth, N. H.

NEW CONSTRUCTION:

Seven submarines, Searaven, Seawolf, Triton, Trout, Marlin, Grayling and Grenadier.

THE PUSEY & JONES CORP.

Wilmington, Del.

NEW CONSTRUCTION:

Hull No. 1071, one steel lighthouse tender, Lilac Class, for Dept. of Commerce, Bureau of Lighthouses. Gross tonnage approximately 700 tons. Keel laid October 17, 1938; **completion date August 20, 1939.**

Two streamlined diesel tugs for Curtis Bay Towing Company; powered by 320 H.P. Enterprise engines; cost $200,000.

SUN SHIPBUILDING AND DRY DOCK COMPANY

Chester, Pa.

NEW CONSTRUCTION:

Hulls Nos. 176-180, five single screw diesel cargo vessels, C-2 design, for U. S. Maritime Commission; equipped with Sun-Doxford engines. **Delivery dates, No. 176, July 27, 1939; No. 177, August 14, 1939; No. 178, September 10, 1939; No. 179, September 25, 1939;** No. 180, October 15, 1939.

Hull No. 181, single screw steam turbo electric drive tanker for Atlantic Refining Co.; 521' x 70' x 40'. Keel laid November 21, 1938; launched July 29, 1939; **delivery date September 15, 1939.**

Hulls Nos. 182, 183, 184 and 185, four single screw diesel cargo vessels for U. S. Maritime Commission, C-3 design. Equipped with Busch Sulzer engines. Delivery dates November 15, 1939; December 20, 1939; January 20, 1940, and February 20, 1940.

Hulls Nos. 186-189, four C-3 single screw combination passenger and cargo vessels; diesel propelled; equipped with Sun-Doxford engines. Delivery dates October 6, 1940; December 5, 1940; February 3, 1941, and April 4, 1941.

One 16-knot tanker for Texas Co.; 13,285 tons dwt. Delivery date June, 1940.

TAMPA SHIPBUILDING & ENGINEERING CO.

P. O. Box 1838

Tampa, Fla.

NEW CONSTRUCTION:

Hulls Nos. 33-36, four C-2 type cargo vessels for U. S. Maritime Commission; 459' x 63' x 31' 6"; 9291 dwt. tons; diesel powered; cost $1,808,413 each. **Estimated launching dates September 16, 1939, and October 16, 1939.**

Trade Literature

Foreign Marks of Origin Regulations, a handbook prepared by the Division of Foreign Tariffs of the Bureau of Foreign and Domestic Commerce.

This book meets the demand for general and particular information on foreign marks of origin. The official laws and regulations of all foreign countries on the subject have been reviewed and summarized. Where special markings of origin are necessary for specified products or under special conditions, those requirements have been set out in full detail so that American exporters and producers may know in advance what will be acceptable to the customs authorities of the various countries.

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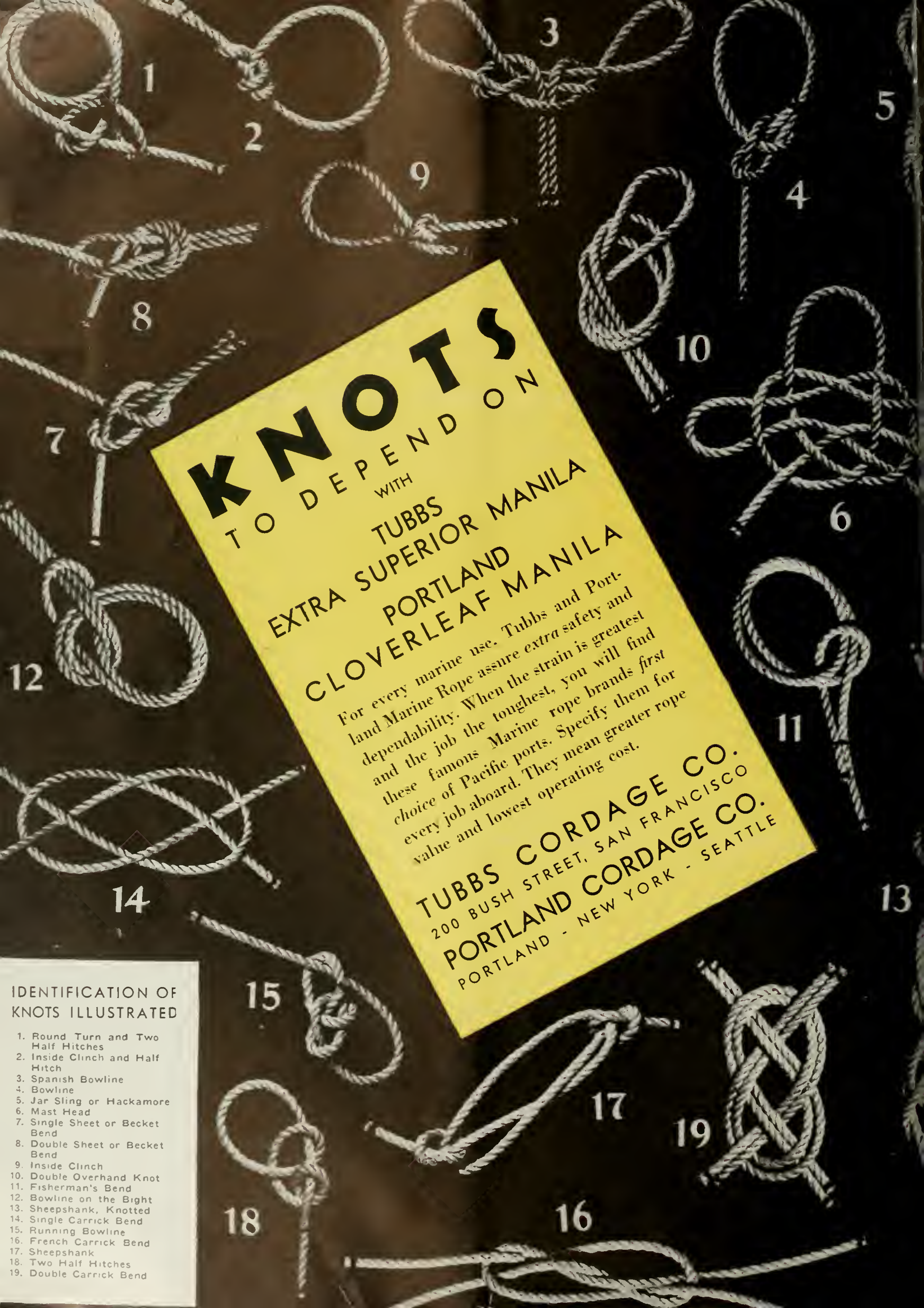
Copies of the handbook may be purchased from the Bureau of Foreign and Domestic Commerce, located at 311 Customhouse, San Francisco. The handbook contains 186 pages and is priced at 50 cents per copy.

PACIFIC MARINE REVIEW

October
1939



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2. Inside Clinch and Half Hitch
3. Spanish Bowline
4. Bowline
5. Jar Sling or Hackamore
6. Mast Head
7. Single Sheet or Becket Bend
8. Double Sheet or Becket Bend
9. Inside Clinch
10. Double Overhand Knot
11. Fisherman's Bend
12. Bowline on the Bight
13. Sheepshank, Knotted
14. Single Carrick Bend
15. Running Bowline
16. French Carrick Bend
17. Sheepshank
18. Two Half Hitches
19. Double Carrick Bend

Official Organ

Pacific American Steamship Association

Shipowners Association of the Pacific Coast

PACIFIC MARINE REVIEW

Contents - October, 1939

Editorial Comment:

Pacific Coast Shipbuilding Revival 25

A Marine Steam Economy Record 25

A War Suggestion for Americans 25

The American Shipbuilding Position 26
By H. Gerrish Smith.

"I Christen Thee America!" 30

Ship Operators' Obligation to Deliver Cargo 36
By H. C. Cantelow.

Launching the Sea Arrow 38

Your Problems Answered 42
By "The Chief."

Steady As You Go! 45

The Marine Fluid Drive 48

Preservation by Charring 49

The Danforth Navy Anchor 50

A New Marine Diesel 51

On the Ways 52
Latest News from American Shipyards.

Marine Insurance 55

Building in American Yards 70

PUBLISHED AT 500 SANSOME STREET . . . . SAN FRANCISCO

Entered as second class matter June 20, 1913, at the post office, San Francisco, under the Act of March 3, 1879. Published on the 1st of each month. Advertising and editorial forms close on the 15th. Subscription price, one year: Domestic, $1.50; foreign, $2.50; two years: Domestic, $2.50; foreign, $4.00; three years: Domestic, $3.00; foreign, $5.50; single copies, 25c. Chas. F. A. Mann, Northwest Representative, 1110 Puget Sound Bank Bldg., Tacoma, Washington. New York Office, Suite 404-405-406, Two Hundred Broadway, Telephone COrdlandt 7-3579.

In New York City copies of Pacific Marine Review can be purchased at the news stands of I. Goldberg, 42 Broadway; Harry Nash, 17 Battery Place; Philip Mandara, Greenwich Street and Battery Place. In Washington, D. C., at the news stand of the Carlton Hotel, 16th and K Streets.

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Based on these figures, the approximate operating characteristics of these ships, fully loaded in service, will be as follows:

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MINIMUM COSTS FOR LUBRICATING OIL AND MAINTENANCE

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LINCOLN HIGHWAY, KEARNY, NEW JERSEY

UNITED STATES STEEL

FROM THE DAILY REPORT OF A TIGER BRAND WIRE ROPE ENGINEER

No sooner stepped in here this morning when the super had me by the arm. "Come with me," he said, "I want to show you something."

At the scrap pile he pointed at a discarded sheave. "There's a sheave that has chewed up its last wire rope," he said. "Only a few months old but it's already ruined two ropes."

I could see it was badly corrugated. "The trouble with that sheave," I told him, "is that it wasn't hard enough to stand the rope pressure. Why, the best wire rope in the world couldn't last on those corrugations. Make sure your sheaves are hard enough and you'll save plenty on rope and sheaves, too."

You can bet your shirt he'll use good hard sheaves from now on.

Yours,
Al

...THAT SHEAVE HAS CHEWED UP ITS LAST WIRE ROPE!

THE material from which a sheave is made should be hard enough to withstand the wear caused by the pressure of the rope on the sheave groove. Sheaves made from too soft material not only wear rapidly, but also shorten the rope life, because the deepened grooves do not provide working clearances for the rope. The resultant pinching of the rope imposes a binding action which prevents proper load distribution, and causes excessive internal and external friction. Corrugations from strand and wire impressions further reduce rope life by accelerating wear.

Limiting values of the pressure between a rope and sheave to secure satisfactory service have been established for all common materials from which sheaves are manufactured. If you are encountering undue sheave wear, our Engineering Department will gladly help you determine the pressure on your sheaves and make money-saving recommendations based on these standards.

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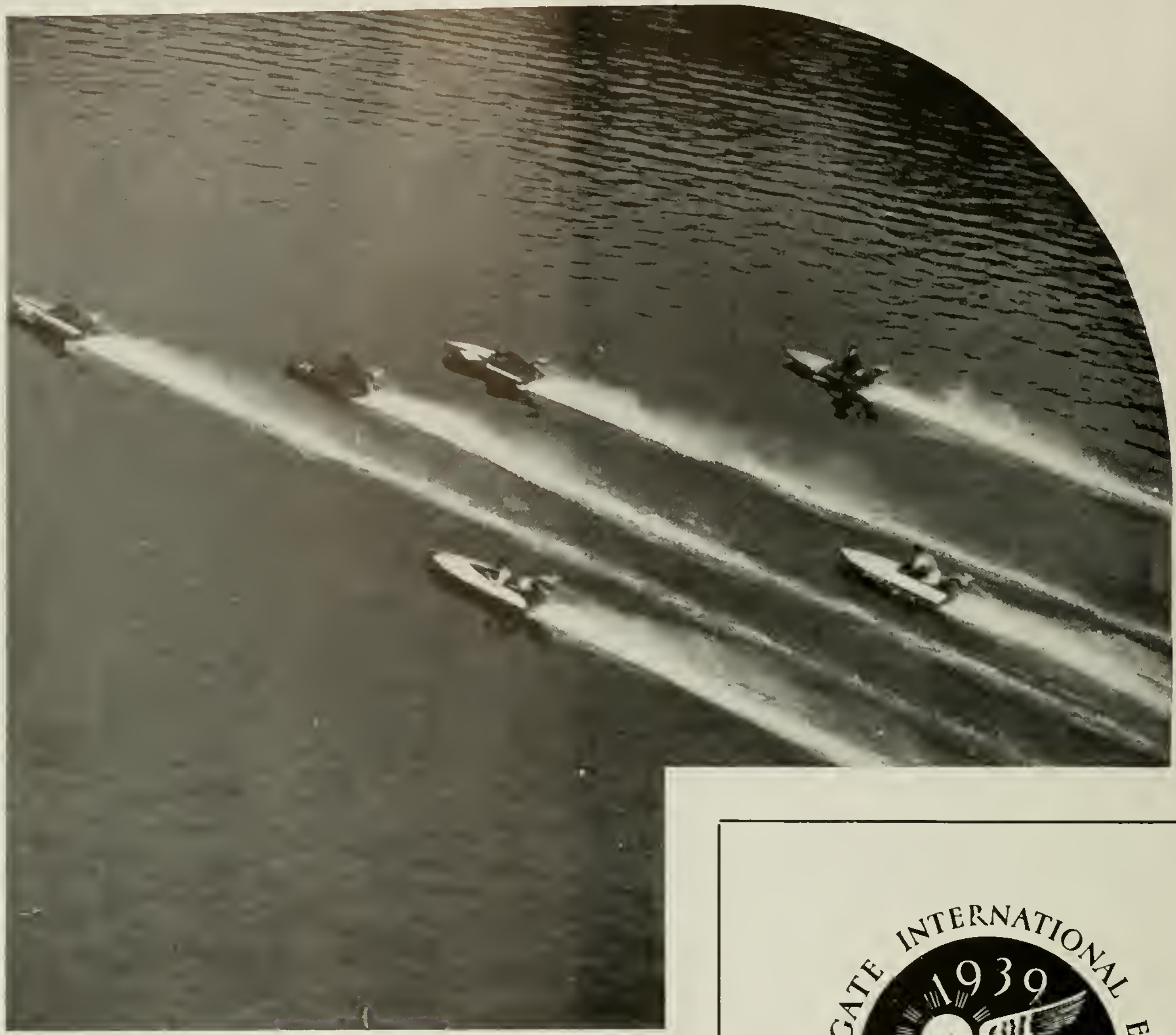

Webster defines SPEED as "rate of motion; also rate of PERFORMANCE, as indicated by ratio of amount of work accomplished to time taken".

Swift little speed boats aptly symbolize one phase of SPEED—"rate of motion" . . . . . but SPEED in itself is valuable only insofar as it is related to PERFORMANCE and ACCURACY.

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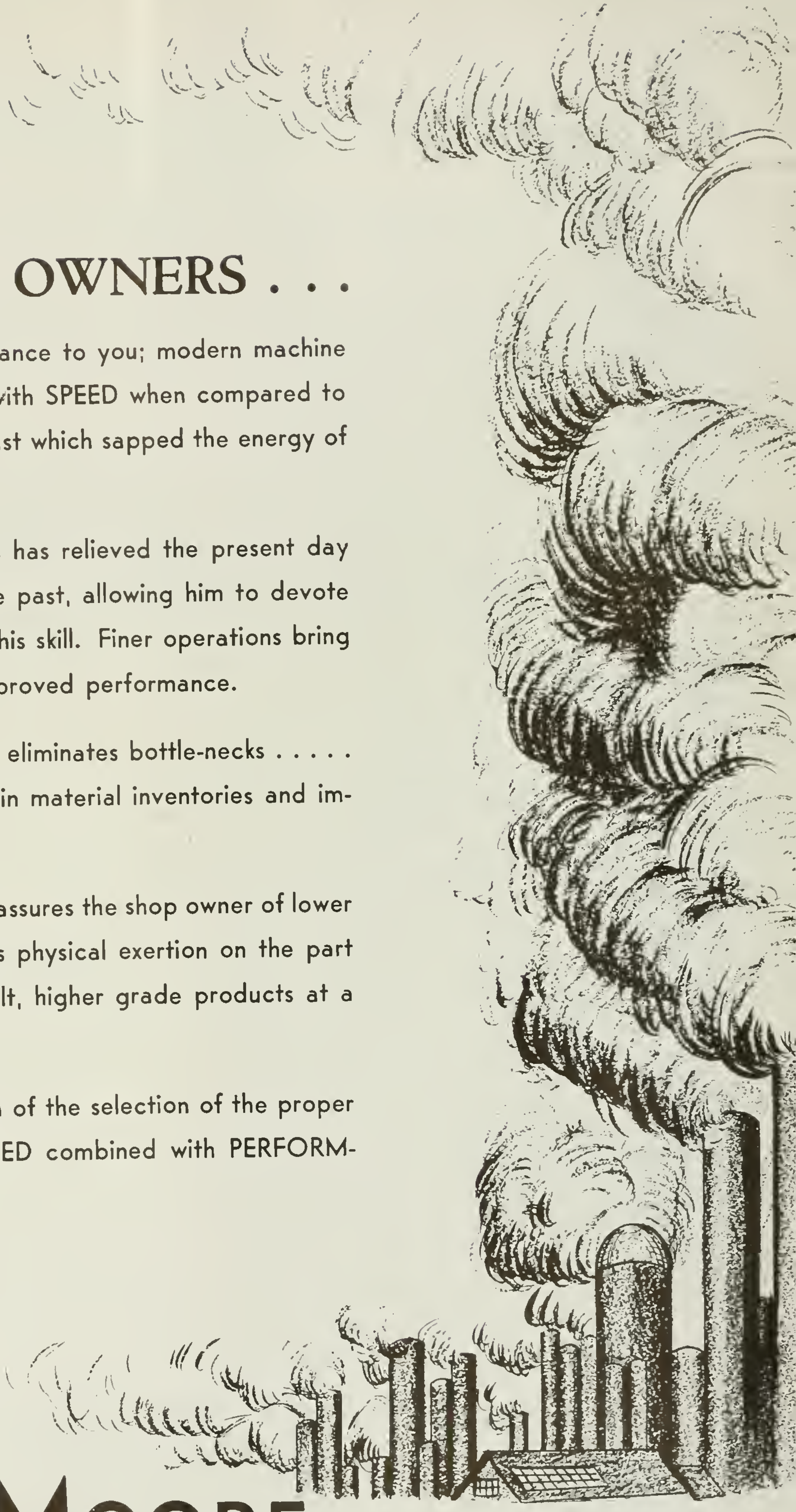
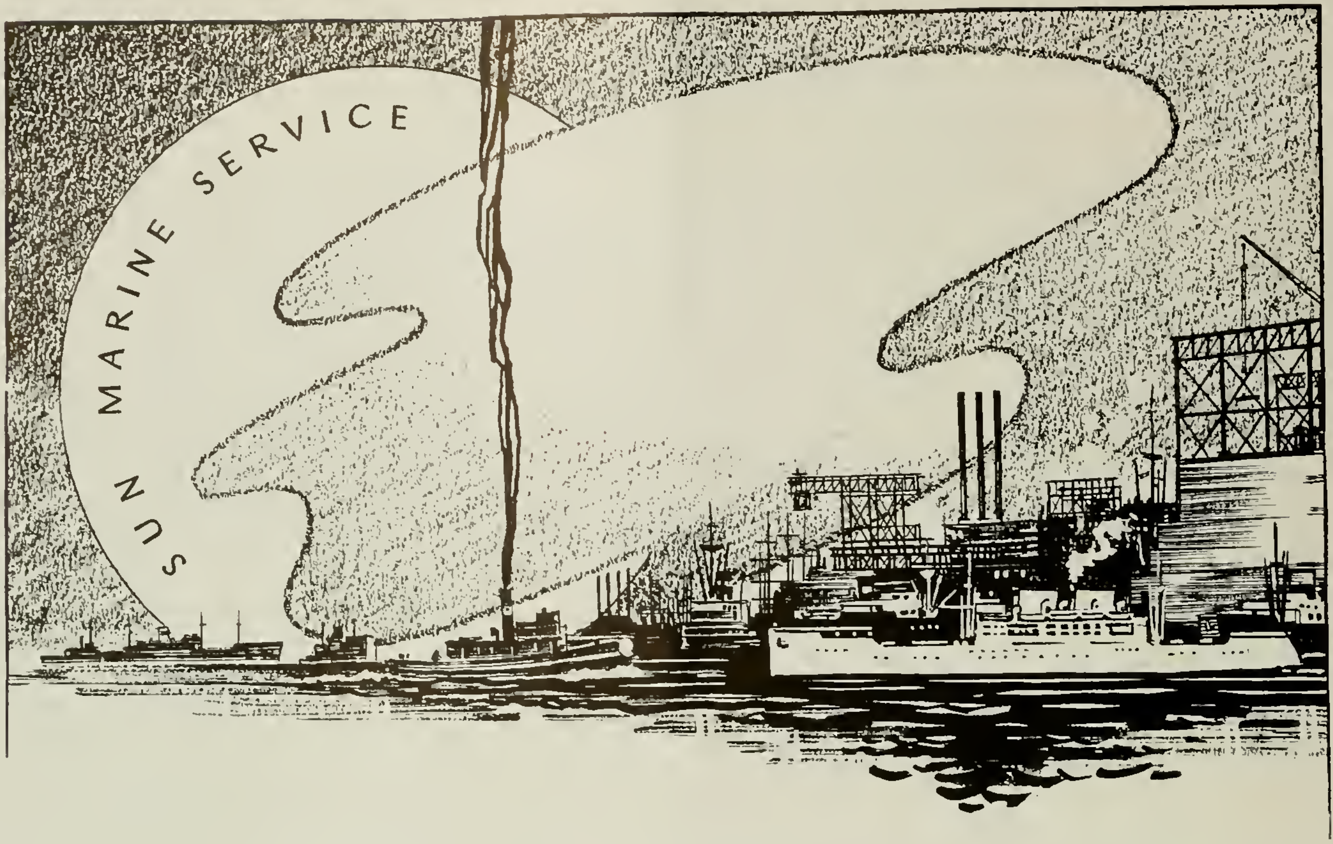


6th & Santa Fe, Los Angeles MOORE MACHINERY CO. **1625 Van Ness, San Francisco**



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General Electric Engineers Designed a Special Motor to Operate Under the Severe Conditions

They faced difficult problems. First, the 40-hp motor had to fit in the circular bell of little more than two-foot diameter. Second, it should operate satisfactorily in the bell even if submerged as much as 40 feet. At this depth, water would be forced up into the bell until but little more than a foot below the motor. Cooling the motor must be accomplished with the small quantity of air remaining.

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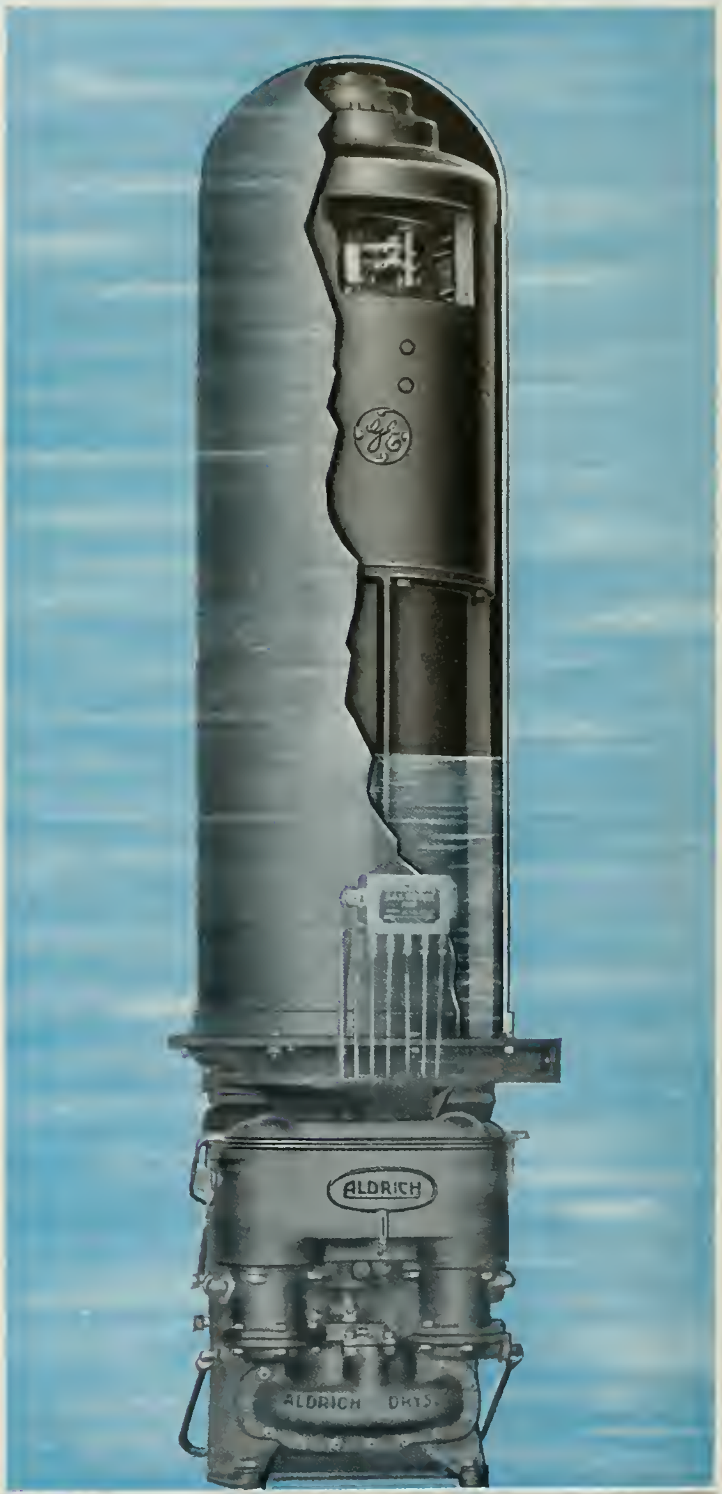

GENERAL ELECTRIC

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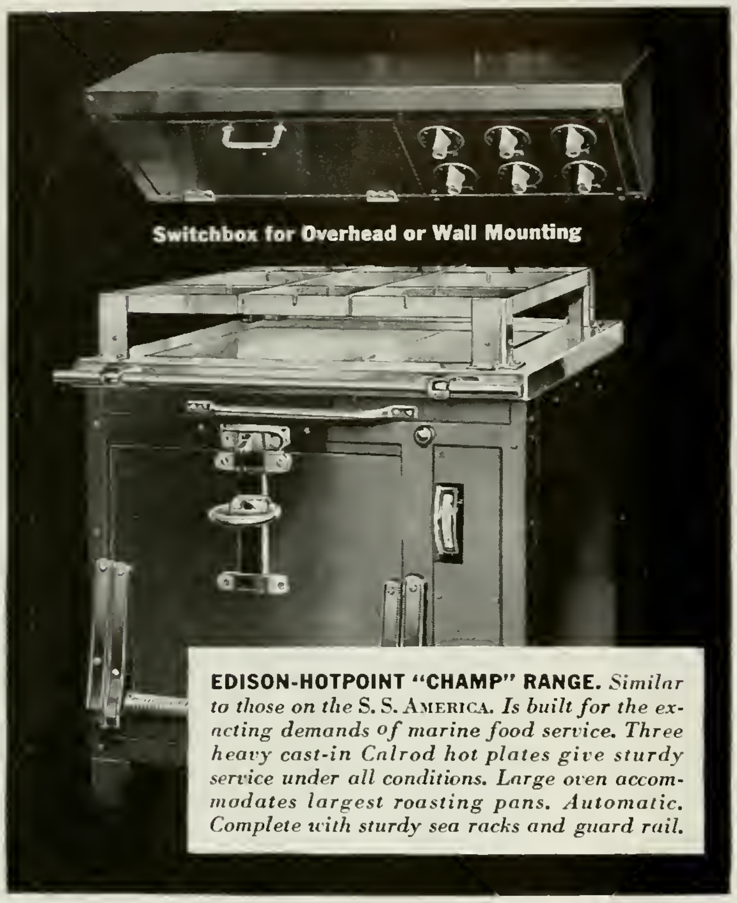

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Calrod will stand up in rough seas and salt air for years longer. It cannot be damaged by foods which spill or boil over, or by excessive heat.

ELECTRIC MARINE EQUIPMENT EDISON

Equipped for ELECTRIC HOTPOINT Electric Ranges

Only the finest of foods, cooked electrically on Edison-Hotpoint Galley equipment, will be served in the exquisitely appointed dining salons of the new S. S. AMERICA.

In Luxury Liner or Submarine—Yacht or Fishing Vessel— EDISON-HOTPOINT IS COMPLETE

Edison-Hotpoint's trained engineers are well-equipped to work with you in the modernization of the galley.

Their experience ranges from oil tankers to Luxury Liners and U. S. Navy's submarines, aircraft carriers and destroyers.

Edison-Hotpoint equipment is dedicated to the belief that courage and dependability should be as much a part of an electric galley range or marine griddle as it is of the crew of men on whom the skipper depends.

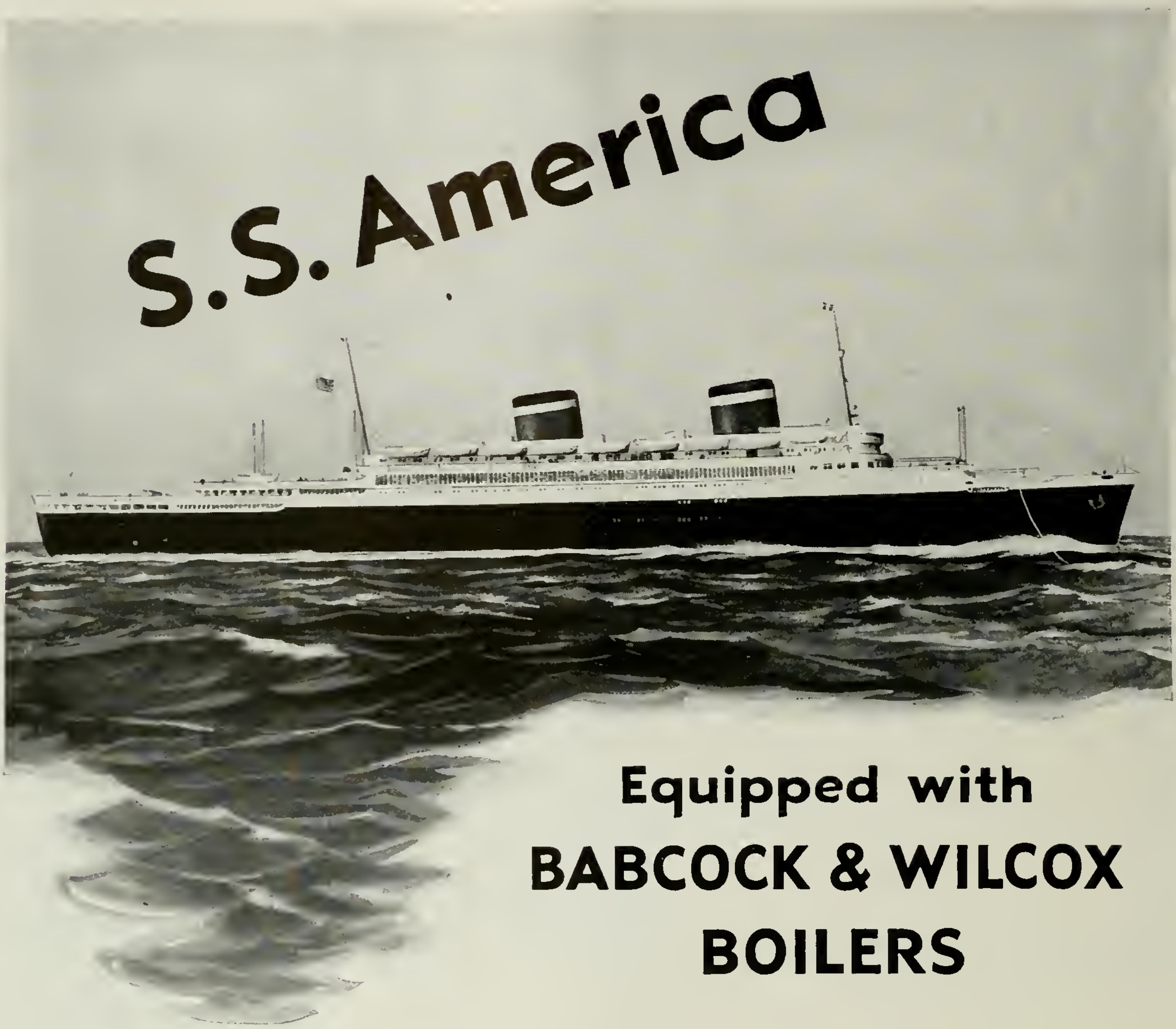
Many a time when the going is rough, when old-fashioned galley stoves would be out of commission, Edison-Hotpoint Calrod galley equipment turns out hot food for the men—keeps spirits up.

Write today for complete information about Edison-Hotpoint's complete line.

EDISON GENERAL ELECTRIC APPLIANCE CO., INC., 5682 West Taylor Street, Chicago, Ill.
Distributed in Canada by CANADIAN GENERAL ELECTRIC COMPANY, LTD., TORONTO

Hotpoint

"HUSKY" RANGE • BAKE OVENS
GRIDDLES • FRY KETTLES • BROILERS



Equipped with BABCOCK & WILCOX BOILERS

Other U. S. Liners Equipped with Babcock & Wilcox Boilers are —

S. S. Manhattan
Washington
President Harding
President Roosevelt
American Banker
American Farmer
American Merchant
American Trader
American Importer
American Shipper
American Traveler

THE largest and fastest American-flag liner —recently launched at Newport News for the United States Lines—is equipped with six Babcock & Wilcox Boilers.

Eleven other ships operated by the U. S. Lines are also fitted with Babcock & Wilcox Boilers. Nine of these ships have been in service more than 17 years.

On the Pacific Coast
C. C. MOORE & CO.
450 MISSION STREET
SAN FRANCISCO, CAL.

THE BABCOCK & WILCOX COMPANY
85 LIBERTY STREET NEW YORK, N. Y.

BABCOCK & WILCOX

DE LAVAL GEARS

for the NEW UNITED STATES LINER

AMERICA

The largest and swiftest ever built in the United States

The U. S. Liner AMERICA, being built by the Newport News Shipbuilding & Dry Dock Co., will be equipped with DE LAVAL main reduction gears which are the largest in physical dimensions ever installed in a ship in this country, the pitch diameter being 174 in. Each will transmit 17,000 h.p. to one of the twin screws at 128 r.p.m., and will be driven by three pinions, two directly coupled to the low pressure and intermediate pressure turbines, respectively, while for the high pressure turbine a double reduction is used.

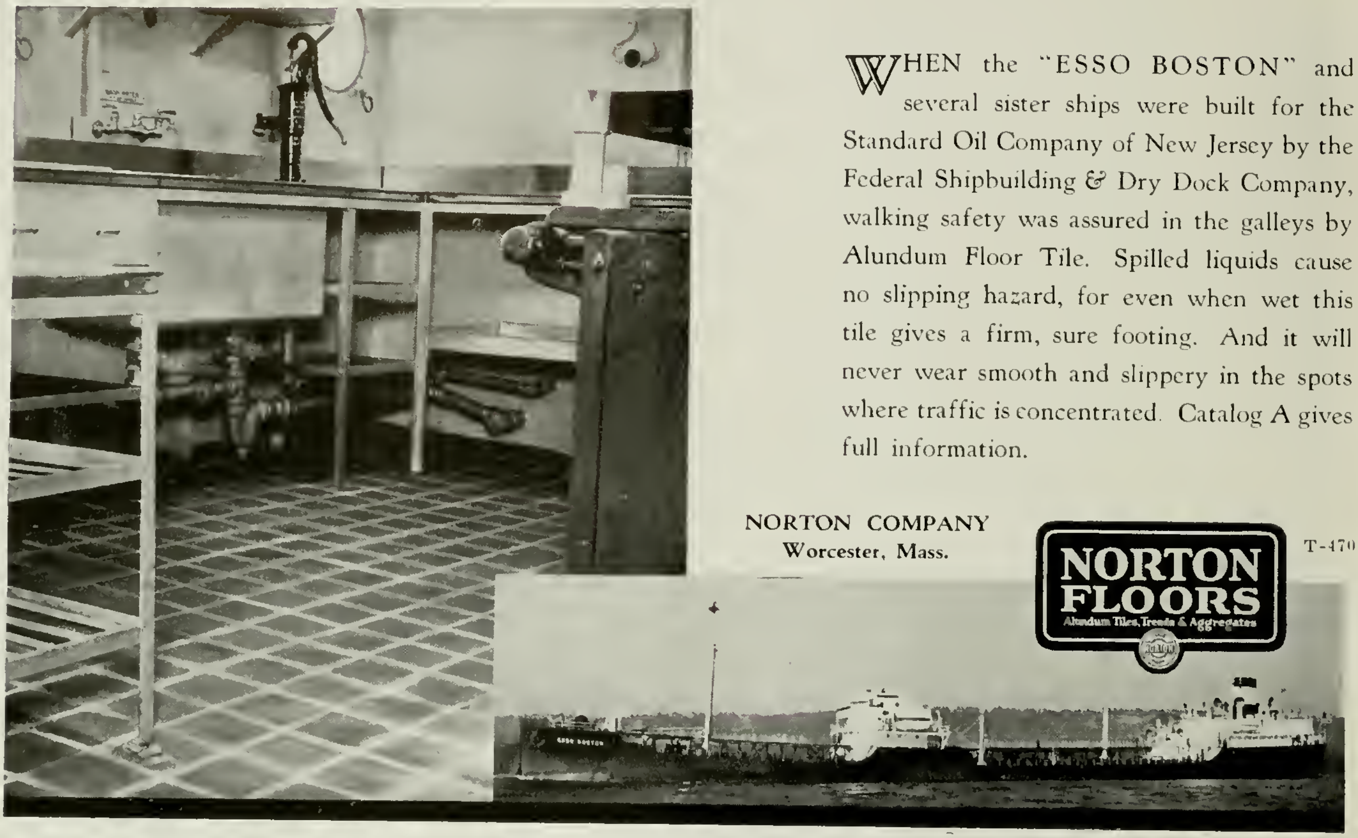
De Laval Turbine-driven FEED PUMPS will supply the boilers.

Data on De Laval marine power equipment will be gladly supplied upon request to ship owners, naval architects and marine engineers.

2120

DE LAVAL STEAM TURBINE CO. • TRENTON, N. J.

There's No Slipping Hazard in the Galley *on this Modern Tanker*



WHEN the "ESSO BOSTON" and several sister ships were built for the Standard Oil Company of New Jersey by the Federal Shipbuilding & Dry Dock Company, walking safety was assured in the galleys by Alundum Floor Tile. Spilled liquids cause no slipping hazard, for even when wet this tile gives a firm, sure footing. And it will never wear smooth and slippery in the spots where traffic is concentrated. Catalog A gives full information.

NORTON COMPANY
Worcester, Mass.

NORTON FLOORS
Alundum Tiles, Treads & Aggregates

T-470

American President Lines

Regular, frequent and dependable sailing schedules for Round the World and for Transpacific services. Express-freight, passenger and refrigerator vessels.

AMERICAN PRESIDENT LINES

NEW YORK
BOSTON
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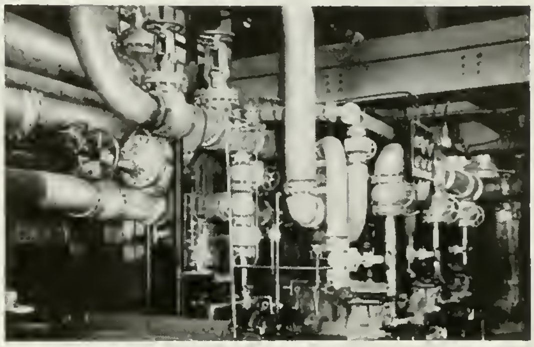
311 CALIFORNIA STREET, SAN FRANCISCO
Offices and agents throughout the world

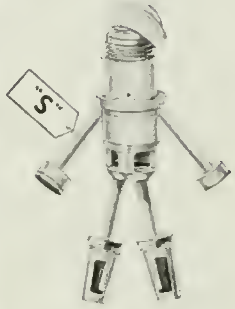
DETROIT
WASHINGTON, D. C.
LOS ANGELES

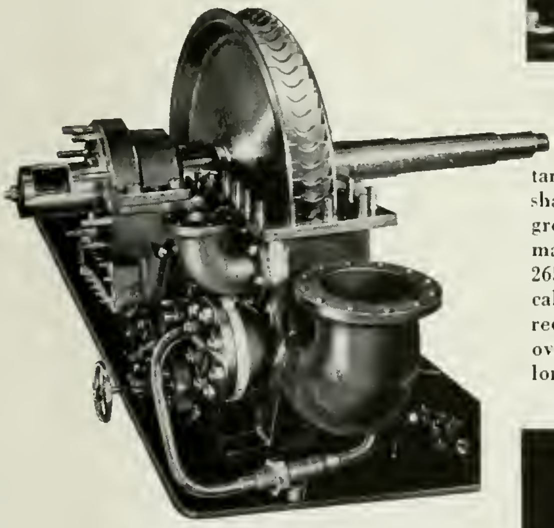
A Sturdy Crew... *that* MANS A SCORE OF STATIONS

Four metals that assure exceptional performance in a wide variety of marine applications

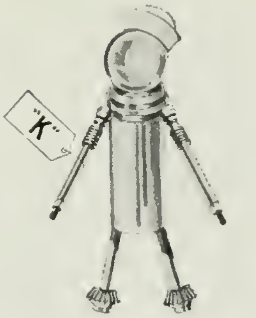
High-temperature Valve-trim: Constantly increasing pressures and temperatures tend to shorten the life of valve-trim. To meet these conditions, cast "S" Monel* has been developed for greater hardness. This new alloy is heat resistant, non-galling and available with hardness up to 325 Brinell. In two new tankers utilizing a steam pressure of 410 pounds, temperature 700°F., "S" Monel was selected for valve-trim.



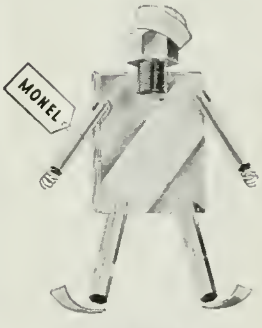




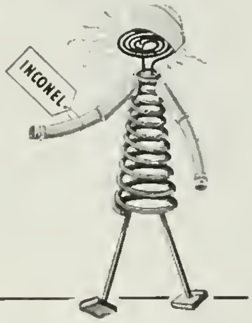
High-strength Rustless Pump Shafts: Because of its combination of strength plus corrosion resistance, Monel has long been a popular metal for pump shafts. A newer alloy, "K" Monel* now offers even greater strength, stiffness and hardness. It is readily machinable, yet can be hardened by heat treatment to 265-315 Brinell—tensile strength 140-170,000. A typical application for "K" Monel is the shaft in this direct drive turbo-propeller type pump. Only 6′ 3″ in overall length, this pump has a capacity of 19,500 gallons a minute.



Long-lived Propeller Shafting: Recent losses suffered by Pacific tuna fishermen, including that of a $30,000 cargo, were caused by failure of propeller shafts. As a result, many new tuna boats, and old ones too, are installing Monel shafts. Stronger and tougher than steel, Monel is also rust proof and resistant to corrosion by salt water. So Monel shafts *retain* their strength and afford years of dependable service.



Heat-resistant Bolts: These three bolts are used for securing refractory linings in oil burning marine boilers. Subjected to a continuous temperature of 2100°F., they resist both corrosion and oxidation and retain their strength. The reason? They are made of Inconel*...the ideal material for any applications where strength at high temperature is required.



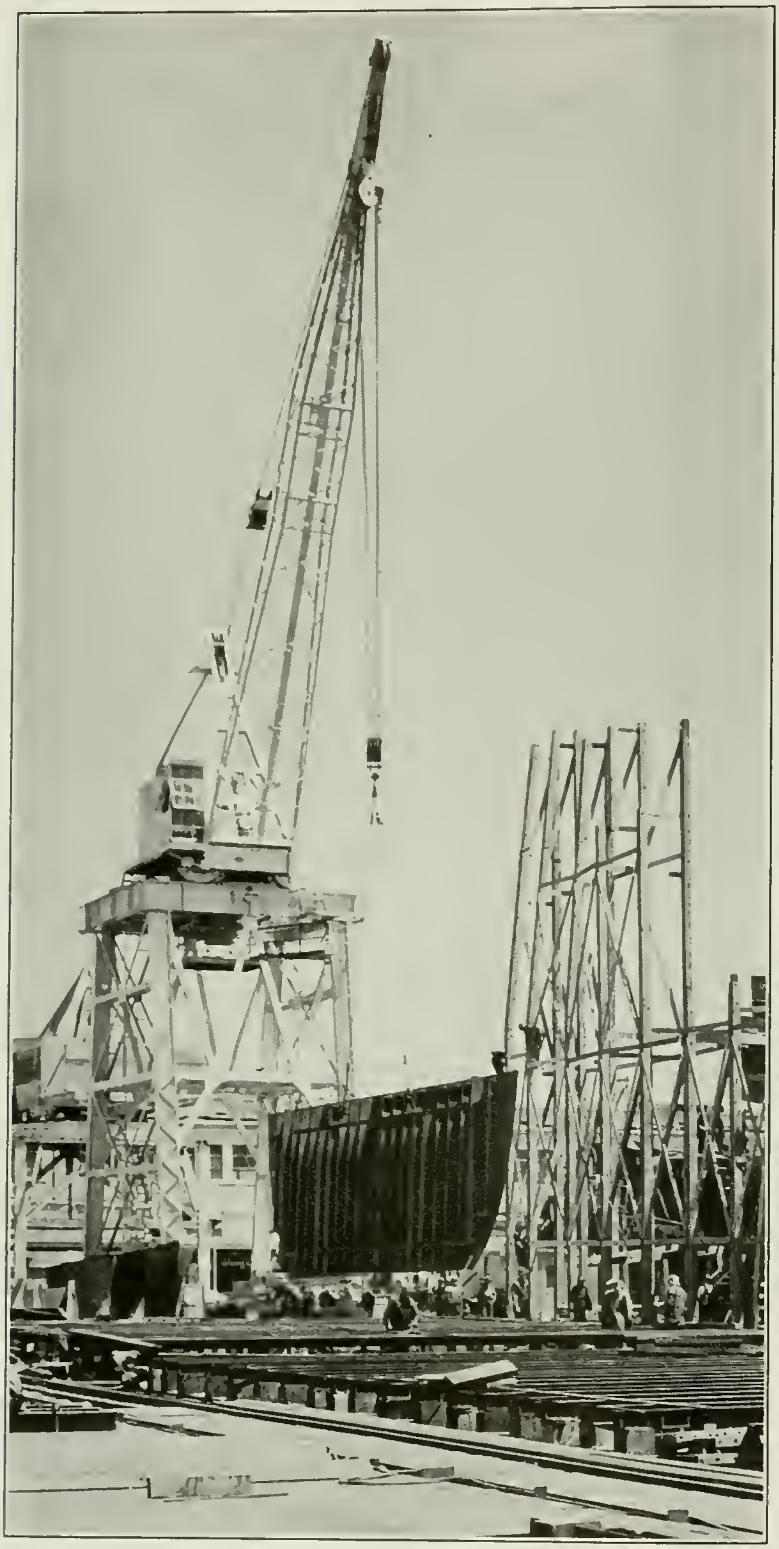
● Whenever you need a strong, rust proof metal, use Monel or one of the other high Nickel-copper alloys. *Which one* to use depends on the *additional* properties you need...heat-treatability...exceptional hardness...resistance to heat... exceptional spring properties, etc. Write for detailed information about each.

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET, NEW YORK, N. Y.

MONEL AND OTHER HIGH NICKEL-COPPER ALLOYS

"Monel" and other trade-marks which have an asterisk associated with them are trade-marks of The International Nickel Company, Inc.

The MOORE DRY DOCK COMPANY



Moore Dry Dock Company's yard May 24 — Clyde Whirley in operation using 40-ton capacity main hook line.

Selected a

CLYDE WHIRLEY

. . . in keeping with their policy to have the most modern equipment for shipbuilding and ship repairs . . . to insure accuracy and speed.

●

Clyde Whirleys are traveling, full revolving, long reach, heavy duty machines, especially adapted to ship yard service. They are simple in design, reliable, economical and versatile. Electric, gasoline, steam or Diesel power. Capacities from 50 tons at 50 foot radius to 11 tons at 150 foot radius.

Write for Bulletin K-12. It contains full descriptions and specifications.

●

West Coast Representatives

CLYDE EQUIPMENT CO.
Portland, Ore. Seattle, Wash.

WEBER & CO.
San Francisco, Calif.

LE ROI-RIX MACHINERY CO.
Los Angeles, Calif.

CLYDE

CLYDE IRON WORKS, Inc.

DULUTH -- MINN.

CARGO WINCHES . . . CAPSTANS . . . WINDLASSES . . . MOORING WINCHES . . . TOW HAULAGE WINCHES
WARPING WINCHES . . . HOISTING EQUIPMENT FOR DREDGES, BARGES AND LIGHTERS

VOLUME 36
No. 10

PACIFIC MARINE REVIEW

OCTOBER
1939

Pacific Coast Shipbuilding Revival

In these days when every Pacific Coast Chamber of Commerce, from Bellingham to San Diego, and every Pacific Coast politician of whatever party, is claiming the credit for reviving shipbuilding on the Pacific Coast, we wish to inject the claims of Pacific Marine Review and its editor.

On August 15 we wrote an editorial for the September issue under the caption, "Let's Speed Up Our Merchant Navy," respectfully indicating to the Maritime Commission the necessity for more speed in allotting contracts if they wished to finish in 10 years even their modest program of "minimum naval needs." We then went away for a vacation.

We knew before leaving that every key executive on the Maritime Commission *subscribes* for Pacific Marine Review. We discovered on our return that all of these executives *read* Pacific Marine Review, and are influenced by what they read, for we found them awarding and allotting contracts at a rate so fast it made us dizzy trying to keep track of yards and prices and types of ships.

So it is plainly evident!

To say we are glad of these Pacific Coast contracts is putting it very mildly.

The Pacific Coast shipyards that have kept their organizations intact and have somewhat maintained their plant through all the lean years are now feeling renewed life and energy. To them we extend our heartiest best wishes for the busy and, we hope, prosperous years ahead.

Pacific Coast came to the middle of August with two ships building at the Moore Dry Dock Co. in Oakland. By the middle of September, Pacific Coast was practically sure of: four ships at Consolidated Steel, Los Angeles; five ships at Union Plant, Bethlehem, San Francisco; five ships at Western Pipe and Steel, South San Francisco; five ships at Seattle-Tacoma Shipbuilding Company, Puget Sound; and two more ships at Moore Dry Dock Co., Oakland.

This program approximates a total value of $50,000,000 in seagoing merchant shipbuilding on the Pacific Coast, and if we add the new naval work under construction at Mare Island Navy Yard, California, and at Puget Sound Navy Yard, Bremerton, Washington, the grand total would be around $100,000,000.

A Wartime Suggestion for American Citizens

Europe and Asia being at war, we in America are constantly being bombarded with propaganda of various sorts designed to "keep us out" or to "get us in." During such times the urge to "do something" about the situation is constantly surging within every human heart, and the desire for some outlet becomes almost overpowering.

We suggest as at least a partial outlet that every American citizen enlist in that great army of mercy, the American Red Cross, and thereby feel that he is doing his bit in helping to make less painful the results of this furious orgy of insane fears and hatreds that is destroying civilization and driving the world back to the "Dark Ages."

The Red Cross stands for mercy and love and sacrifice in a world surcharged with cruelty and hate and greed. You can be sure, in joining the Red Cross, that you are enlisted on the right side.

Pacific Coast Merchant Shipbuilding

No. and Type	*Yard*	*Location*	*Cost*
Two C-3 steamers	Moore Dry Dock Co.	Oakland	$ 5,715,520
Five C-1 motorships	Western Pipe & Steel Co.	South San Francisco	$10,635,000
Five C-1 steamers	Bethlehem Union Plant	San Francisco	$10,010,000
Four C-1 steamers	Consolidated Steel Corp.	Los Angeles	$ 7,560,000
Five C-1 motorships	Seattle-Tacoma Shipbuilding Corp.	Tacoma	$10,635,000
TOTAL			$44,555,520

The Present
American Shipbuilding Position

By H. GERRISH SMITH

President National Council American Shipbuilders

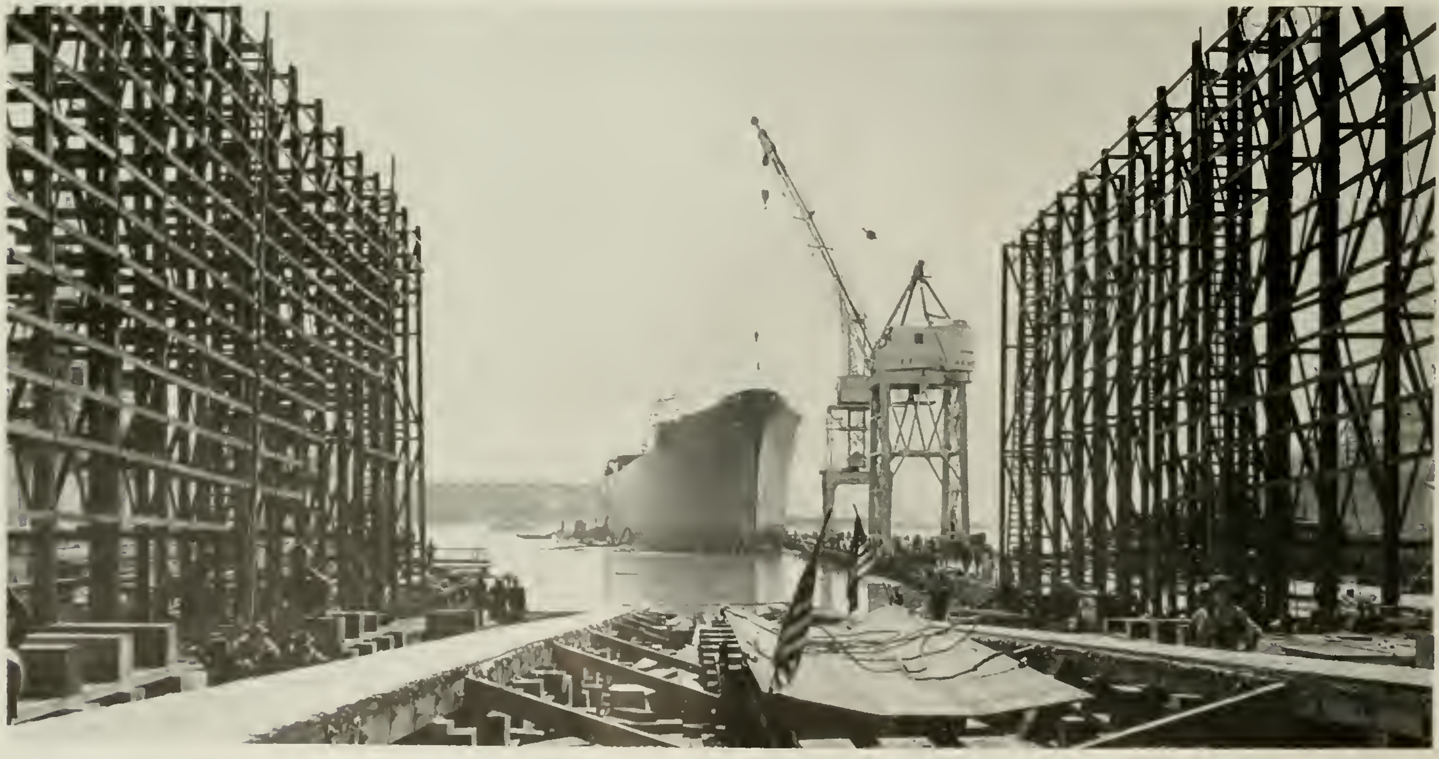
Outbreak of the war in Europe, which already is causing withdrawals of foreign flag tonnage from the foreign trade business of the United States, finds American shipping and shipbuilding in much stronger positions than they occupied twenty-five years ago at the beginning of the World War.

Ever since the War, the policy of Congress has been consistently directed toward the handling of a more substantial portion of our international trade in our own ships. The justification for that policy, which will make us increasingly less dependent on the ships of other nations, is fully manifest in the present international situation.

I have been asked about the position of the privately-owned shipyards of the United States to construct new ships or recondition old ones to supplement our merchant fleet, due to the probable withdrawal from our commercial services of many foreign vessels which will be required for war purposes by their own governments.

The building of the new American merchant marine is now well under way. The Maritime Commission was organized in 1937 and during the first year of its operation, in 1938, awarded contracts for 52 seagoing vessels either for its own account or in conjunction with private operators. Contracts for over 50 additional seagoing vessels have been awarded this year, and numerous other contracts are pending. Ships are being delivered and the nation is in a much better situation to take over its foreign trade business and move its products to the world markets that may be available. They need not be congested at our seaports, as was the case in 1914.

The twenty-one years since the close of the World War have witnessed numerous changes in shipbuilding, which has kept pace with the technological advances in other American industries, and in the opinion of many, has been in the very forefront of such progress. The slowing down of production after the World War permitted the elimination of inefficiencies resulting from the speed of the intensified war program. The industry benefited by the World War experience. Shipyard equipment has been kept up to date and extensively modified in many respects. Continuous study has been given to an improvement of shipyard practices, taking into account not only those in the United States, but in other maritime countries as well.



At the Oakland, California, yard of the Moore Dry Dock Company on September 15. A hull (the Sea Arrow) in the water; another keel on the ways.

American Shipbuilding at a Glance

REPORT NO. 20

U. S. MARITIME COMMISSION
TECHNICAL DIVISION
WASHINGTON, D. C.

DATE SEPTEMBER 1, 1939

VESSELS UNDER CONSTRUCTION

REPORT OF PROGRESS AS OF AUGUST 31, 1939

Type	Propulsion	Commission's		Builder's Hull No.	Name	Operator	Builder	Percentage of Completion		Keel Laid	Launched	Date of Contract	Months to Build	Date of Completion	
		Cont. No.	Hull No.					Total	Gain for Month Total					As per Contract	As Reported By Building Yard
Pass.	Turbine	MC-59	MC-1	369	America	U. S. Lines	Newport News SB & DD Co.	57.48%	4.24%	8/22/38	8/31/39	10/21/37	28	2/20/40	
Tanker	"	MC-78	MC-6	152	Neosho	Standard Oil Co. of N.J.	Federal SB & DD Co.	100.0	0.5	Completed and Delivered to Navy Dept. 8/4/39					
"	"	MC-79	MC-7	153	Esso Trenton	" " "	" " " "	56.0	8.0	3/13/39		1/ 3/38	36	1/ 2/41	3/28/40
"	"	MC-80	MC-8	4329	SS Platte	" " "	Bethlehem Steel Co. Shipbuilding Div. Sparrows Point, Md.	82.0	7.0	9/14/38	7/ 8/39	1/ 3/38	21	10/ 1/39	12/ 1/39
"	"	MC-81	MC-9	4330	Esso Annapolis	" " "	" "	68.0	6.0	12/20/38		1/ 3/38	27	4/ 1/40	
"	"	MC-82	MC-10	4331	Esso Albany	" " "	" "	14.0	0.0			1/ 3/38	36	1/ 1/41	
"	"	MC-83	MC-11	370	Esso Richmond	" " "	Newport News SB & DD Co.	63.0	5.0	1/16/39		1/ 3/38	26½	3/15/40	4/12/40
"	"	MC-84	MC-12	371	Esso Raleigh	" " "	" " "	28.0	8.0	5/ 8/39		1/ 3/38	27½	4/15/40	6/10/40
"	"	MC-85	MC-13	372	Esso Columbia	" " "	" " "	12.0	0.0			1/ 3/38	38½	3/15/41	
C2-Cargo	"	MCc-26	MC-15	155	Red Jacket	Am. Hampton Roads-Yankee Line	Federal SB & DD Co.	99.7	2.7	9/20/38	5/20/39	5/ 9/38	Days 480	9/ 1/39	9/ 6/39
"	"	MCc-27	MC-16	156	Lightning	" "	" " " "	98.0	7.9	1/ 3/39	7/15/39	5/ 9/38	540	10/31/39	9/30/39
"	"	MCc-28	MC-17	157	Flying Cloud	" "	" " " "	78.0	8.1	3/16/39		5/ 9/38	600	12/30/39	12/30/39
"	Diesel	MCc-31	MC-20	177	Mormacwren	Moore-McCormack Lines, Inc.	Sun SB & DD Co.	100.0	1.5	Completed and Delivered to Moore-McC. Lines					8/18/39
"	"	MCc-32	MC-21	178	Mormacdove	" "	" " " "	99.0	5.7	8/15/38	7/ 6/39	5/10/38	600	12/31/39	9/22/39
"	"	MCc-19	MC-22	33	Sea Witch	Am. Pioneer Line	Tampa SB & Engr. Co.	42.8	4.2	9/21/38		5/21/38	522	10/25/39	
C2-Cargo	Diesel	MCc-20	MC-23	34	Shooting Star	Am. Pioneer Line	Tampa SB & Engr. Co.	39.9	2.9	9/24/38		5/21/38	581	12/23/39	
	"	MCc-21	MC-24	35	Surprise	" "	" " " "	9.6	2.3			5/21/38	642	2/22/40	
"	"	MCc-22	MC-25	36	Sweepstakes	" "	" " " "	9.6	2.3			5/21/38	701	4/21/40	
"	Turbine	MCc-40	MC-26	373	Nightingale	Am. Hampton Roads-Yankee Line	Newport News SB & DD Co.	94.0	2.5	11/14/38	4/28/39	6/ 7/38	420	8/ 2/39	10/13/39
"	"	MCc-41	MC-27	374	Stag Hound	" "	" " "	87.2	3.1	11/28/38	6/21/39	6/ 7/38	480	10/ 1/39	11/15/39
"	"	MCc-42	MC-28	375	Santa Ana	Grace Line Inc.	" " "	65.4	13.3	3/ 6/39		6/ 7/38	540	11/30/39	2/29/40
"	"	MCc-43	MC-29	376	Santa Teresa	" "	" " "	47.0	2.8	5/ 1/39		6/ 7/38	600	1/29/40	3/29/40
"	Diesel	MCc-51	MC-30	179	Mormacgull	Moore-McCormack Lines, Inc.	Sun SB & DD Co.	92.7	13.8	1/12/39	8/28/39	6/21/38	618	3/ 1/40	10/13/39
"	"	MCc-52	MC-31	180	Mormaclark	" "	" " " "	85.7	19.4	3/ 9/39		6/21/38	678	5/ 1/40	10/27/39
"	Turbine	MCc-53	MC-32	158	Flying Fish	Am. Pioneer Line	Federal SB & DD Co.	58.6	8.4	5/26/39		6/21/38	617	2/29/40	2/29/40
"	"	MCc-54	MC-33	159	Comet	" "	" " " "	53.6	6.0	5/26/39		6/21/38	677	4/29/40	4/29/40
Cargo	"	MCc-91	MC-34	1474	Exporter	Am. Ex-Lines Inc.	Bethlehem Steel Co. Shipbuilding Div. Fore River Plant Quincy, Mass.	90.1	9.4	11/ 7/38	7/18/39	8/11/38	450	11/ 5/39	11/ 5/39
"	"	MCc-92	MC-35	1475	Explorer	" "		76.9	11.7	12/16/38		8/11/38	480	12/ 5/39	12/ 5/39
"	"	MCc-93	MC-36	1476	Exchange	" "		45.1	6.0	3/16/39		8/11/38	660	6/ 2/40	6/ 2/40
"	"	MCc-94	MC-37	1477	Express	" "		38.8	3.6	7/27/39		8/11/38	720	8/ 1/40	8/ 1/40
C3-Cargo	"	MCc-160	MC-38	162		" "	Federal SB & DD Co.	38.3	7.5	5/ 8/39		11/28/38	450	2/21/40	2/21/40
"	"	MCc-161	MC-39	163			" " " "	30.8	8.0	7/24/39		11/28/38	510	4/21/40	4/21/40
"	"	MCc-162	MC-40	164			" " " "	18.8	2.9			11/28/38	570	6/20/40	6/20/40
"	"	MCc-163	MC-41	165			" " " "	18.3	2.4			11/28/38	630	8/19/40	8/19/40
"	"	MCc-164	MC-42	166			" " " "	12.4	2.3			11/28/38	690	10/18/40	10/18/40
"	"	MCc-165	MC-43	167			" " " "	10.9	2.4			11/28/38	750	12/17/40	12/17/40
"	Diesel	MCc-166	MC-44	182			Sun SB & DD Co.	32.8	11.9	5/ 1/39		12/ 8/38	440	2/21/40	11/15/39
"	"	MCc-167	MC-45	183			" " " "	32.3	11.4	5/ 8/39		12/ 8/38	500	4/21/40	12/22/39
"	"	MCc-168	MC-46	184			" " " "	22.7	10.7	6/ 7/39		12/ 8/38	560	6/20/40	1/30/40
"	"	MCc-169	MC-47	185			" " " "	22.5	10.5	7/ 7/39		12/ 8/38	620	8/19/40	2/28/40
Pass. & Cargo	Turbine	MCc-173	MC-48	4337	Delbrasil	Miss. Shipping Co. Inc.	Bethlehem Steel Co. Shipbuilding Div. Sparrows Point, Md.	29.9	6.3	4/10/39		12/21/38	528	6/ 1/40	
	"	MCc-174	MC-49	4338	Delargentino			22.7	8.7	5/ 8/39		12/21/38	620	9/ 1/40	
"	"	MCc-175	MC-50	4339	Delorleans			3.9	1.7			12/21/38	711	12/ 1/40	
C3-Cargo	"	MCc-197	MC-51	195			Moore Drydock Co. Oakland, Cal.	36.8	5.9	3/18/39		1/25/39	491	5/30/40	
"	"	MCc-198	MC-52	196				15.1	2.6			1/25/39	551	7/29/40	
C3-Cargo & Pass.	"	MCc-200	MC-53	379		Round the World Service	Newport News SB & DD Co.	3.0	2.0			2/ 6/39	548	8/ 7/40	10/ 7/40
"	"	MCc-201	MC-54	380		" "	" " "	2.0	1.0			2/ 6/39	608	10/ 6/40	12/ 6/40
"	"	MCc-202	MC-55	381		" "	" " "	1.0	0.0			2/ 6/39	668	12/ 5/40	2/ 5/40
"	"	MCc-203	MC-56	382		" "	" " "	1.0	0.0			2/ 6/39	728	2/ 3/41	4/ 3/41
"	"	MCc-204	MC-57	383		" "	" " "	1.0	0.0			2/ 6/39	788	4/ 4/41	6/ 4/41
"	"	MCc-205	MC-58	384		" "	" " "	1.0	0.0			2/ 6/39	848	6/ 3/41	8/ 3/41
"	Diesel	MCc-206	MC-59	186		Seattle-Orient Line	Sun SB & DD Co.	1.0	0.0			2/15/39	599	10/ 6/40	8/ 1/40
"	"	MCc-207	MC-60	187		" "	" " " "	1.0	0.0			2/15/39	659	12/ 5/40	9/ 1/40
"	"	MCc-208	MC-61	188		" "	" " " "	1.0	0.0			2/15/39	719	2/ 3/41	11/ 1/40
"	"	MCc-209	MC-62	189		" "	" " " "	1.0	0.0			2/15/39	779	4/ 4/41	12/ 1/40
C3-Cargo	Turbine	MCc-210	MC-63	253			Ingalls Shipbuilding Corp., Pascagoula, Miss.	7.5	3.1	8/14/39		3/15/39	600	11/ 4/40	
"	"	MCc-211	MC-64	254				6.5	2.1	8/14/39		3/15/39	660	1/ 3/41	
"	"	MCc-212	MC-65	255				6.5	2.1	8/21/39		3/15/39	720	3/ 4/41	
"	"	MCc-213	MC-66	256				5.9	1.5			3/15/39	780	5/ 3/41	

This table shows all of the seagoing merchant tonnage building in American yards under orders placed through the U. S. Maritime Commission up to September 1, 1939. Vessels delivered on this program before August 1 are not shown. Since September 1 the Commission has greatly increased the speed of ordering, so that to bring this table up to date there must be added 34 C-1 type, 4 C-3 type, 6 C-2 type, 4 Export type, and 6 Robin Line type, or a total of 54 ships in 27 days.

In consideration of the highly specialized character of the product, shipyard efficiency is undoubtedly on a level with that of other American industries, and well in advance of some.

Ships now being built are vastly different from those built during World War days or even those built ten years ago. The cost of ships has increased enormously in recent years, not only in the United States but throughout the world, due to numerous factors largely beyond the control of the shipbuilder. Among these higher cost factors are higher labor and material costs, higher grade materials, increased safety of life at sea requirements, greatly increased owner and government demands, higher cost of production of plans, higher cost of inspection, higher costs due to social legislation and other Acts of Congress. Recent vessels evidence a much more extensive use of fire-resisting materials and improvements in the accommodations for officers and crew. American ships are almost universally of higher speed than was obtained a few years ago, resulting in higher cost of machinery installations.

Costs are controlled largely by the labor rates in American yards, which are the highest shipbuilding rates paid in the world; and costs of material, which also reflect the higher American wage scales. About half of the cost of the vessel is for material. When labor costs are added, the portion of the total cost of the vessel subject to reduction by shipyard efficiencies is small.

The efficiency of vessels themselves has been improved greatly over vessels of twenty years ago, not only in their form, which permits them to be driven through the water with less power for the same size and speed, but also in the design of machinery that will now develop power at a much lower fuel consumption. The weight, space and fuel consumption for the machinery installation are now approximately one-half of the values for the ships built during the World War period. Cargo cubic capacity and deadweight of ships of the same size and speed are very much greater, due to the foregoing and to welding.

Welding has been adopted by virtually all American shipyards building ocean-going tonnage, and has proved one of the outstanding developments since the introduction of iron ships nearly a century ago. Welding has reduced the weight of steel in the hull of a vessel possibly from ten to fifteen per cent, and it is anticipated that greater experience with welding will also reduce labor costs. In the adoption of welding, the American shipyard is now ahead of the world. Because it leads to a lighter ship, welding means more cargo for a given displacement.

Welding is already limiting sharply the number of rivets in a large percentage of the vessels being constructed, and in some cases it has eliminated virtually all of them. It is anticipated that the limitation of

SUMMARY OF THE EMPLOYMENT OF AMERICAN STEAM AND MOTOR MERCHANT VESSELS OF 1,000 GROSS TONS AND OVER AS OF MARCH 31, 1939

(Does not include Lake or River Tonnage)

Services	*Combination Passenger and Freight*		*Freighters*		*Tankers*		*Total*	
	No.	*Gross Tons*	*No.*	*Gross Tons*	*No.*	*Gross Tons*	*No.*	*Gross Tons*
PRIVATELY OWNED								
*Nearby Foreign	24	154,626	27	122,976	35	256,326	86	533,928
Overseas Foreign	44	430,254	133	774,032	18	147,303	195	1,351,589
Coastwise	46	274,256	416	1,862,282	318	2,155,921	a780	4,292,459
Laid Up Vessels	36	237,444	142	559,985	19	119,737	b197	917,166
Total Privately Owned	150	1,096,580	718	3,319,275	390	2,679,287	1,258	7,095,142
GOVERNMENT OWNED								
*Nearby Foreign	**2	19,244	**2	5,201	—	—	4	24,445
Overseas Foreign	3	61,412	34	190,306	—	—	37	251,718
Coastwise	—	—	—	—	—	—	—	—
Government Service	—	—	—	—	—	—	—	—
Laid Up Vessels	6	110,373	113	666,297	—	—	119	776,670
Total Government Owned	11	191,029	149	861,804	—	—	160	1,052,833
Total American Fleet	161	1,287,609	867	4,181,079	390	2,679,287	1,418	8,147,975

*Nearby includes Canada, Mexico, Central America, West Indies and North Coast South America to and including the Guianas

**Panama R. R. Vessels

Note: Vessels under 2,000 Gross Tons included:

(a) 52 Vessels — 74,708 Gross Tons

(b) 26 Vessels — 28,786 Gross Tons

Courtesy U. S. Maritime Commission, Division of Research.

TABLE 1.- United States Trade with Trade Agreement Countries and with all Other Countries, Jan.-June 1939 Compared with Jan.-June 1938, and Jan.-June 1938-39 Compared with Jan.-June 1934-35

(Values in millions of dollars)

	Comparison of Jan.-June 1939 with Jan.-June 1938				Comparison of Jan.-June 1938-39 with Jan.-June 1934-35			
	Jan.-June 1938 value	Jan.-June 1939 value	Change		Jan.-June 1934-35 average value	Jan.-June 1938-39 average value	Change	
			Value	Percent			Value	Percent
Exports, Including Reexports								
Total, Trade Agreement Countries	886.9[1]	824.4[1]	- 62.5	- 7.0%	370.1[2]	571.9[2]	+ 201.8	+ 54.5%
Total, Non-Agreement Countries	703.9	591.1	- 112.9	- 16.0%	470.4[3]	647.5[3]	+ 177.1	+ 37.7%
Total, All Countries	1,590.8	1,415.4	- 175.4	- 11.0%	1030.1	1,503.1	+ 473.0	45.9%
General Imports								
Total, Trade Agreement Countries	556.7[1]	649.1[1]	+ 92.4	+ 16.6%	373.1[2]	446.7[2]	+ 73.6	+ 19.7%
Total, Non-Agreement Countries	404.2	445.4	+ 41.2	+ 10.2%	403.6[3]	424.8[3]	+ 21.2	+ 5.2%
Total, All Countries	961.0	1,094.6	+ 133.6	+ 13.9%	929.2	1,027.8	+ 98.6	+ 10.6%

General Note: Percentage changes have been calculated upon fuller figures in thousands.

[1] Including the 18 countries (and colonies) with which agreements were in operation during the greater part of the last six months. Only 1 of the agreements was in operation throughout 1935, 6 throughout 1936, 12 by the middle of 1936, 15 by the middle of 1937, 17 by the middle of 1938, and 18 by the middle of 1939, including the agreement with the United Kingdom (covering also Newfoundland and the non-self-governing British Colonies). The last agreement concluded (with Turkey) became provisionally effective only on May 5, 1939, and Turkey is therefore not included in the above calculations as an agreement country.

[2] These figures do not include Ecuador, the United Kingdom (including Newfoundland and non-self-governing British Colonies), and Turkey with which agreements have been concluded but where the period during which the agreement has been in effect is too short to justify inclusion for purposes of comparison.

[3] The apparent discrepancy shown by these figures in comparison with the other totals is due to the non-inclusion of trade with Ecuador and the United Kingdom and its Crown Colonies.

This table is reproduced here to show the relative position of our world trade.

the use of rivets will tend toward fewer and smaller repair bills and longer serviceability for a vessel.

The introduction of welding has eliminated much shop equipment and pneumatic tools required for a riveted ship and has emphasized the desirability of handling facilities of greater capacity in the shipyard, so as to permit the assembly and the complete welding in the shop or on the ground of large units of ship construction material, doing away with the old building practice of assembly bit by bit and the elimination of much of the work that had to be done in the air on scaffolds. Better methods of planning and the moving forward of materials from storage yards to shop and ship in an orderly manner have been important steps in economical and expeditious construction.

These by no means complete the list of advances in building practice that may be noted in the American shipyard, but they tend to evidence that this oldest of American industries is keeping pace with progress in any other field. Our shipyards have not built the largest vessels afloat. The maritime policy of the country has been to favor passenger liners of more moderate size as more nearly meeting our year-around service requirements, and as proving in the end more efficient and economical. But the American shipyard is producing passenger and cargo vessels representing the best performance possible. They are unsurpassed anywhere in the world.

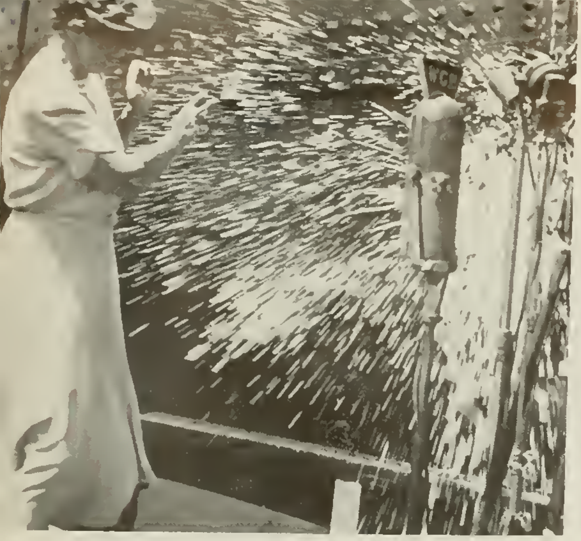
The building of naval vessels for several years past, and the building of commercial vessels for the Maritime Commission and private operators during the last two years, has permitted the shipyards to strengthen their organizations so that at the present time they are in a position, both as to equipment and personnel, to continue to meet any probable demands.

September Ship Contracts

During the August-September period, and up to the 25th of September, the following ships were ordered by the Maritime Commission:

Five C-1 type steamers from Union Plant, Bethlehem.
Five C-1 type motorships from Western Pipe and Steel.
Five C-1 type motorships from Seattle-Tacoma Shipbuilding.
Four C-1 type steamers from Consolidated Steel.
Five C-1 type steamers from Staten Island Plant, Bethlehem.
Five C-1 type steamers from Sparrows Point Plant, Bethlehem.
Five C-1 type steamers from Federal Shipbuilding.
Four Export type steamers from Fore River Plant, Bethlehem.
Three Robin Line type steamers from Sparrows Point Plant, Bethlehem.
Eight C-2 type motorships from Sun Shipbuilding.
Four C-2 type steamers from Tampa Shipbuilding.

This totals 53 vessels, with a cost of approximately $112,000,000.



"I Christen Thee . . . America!"

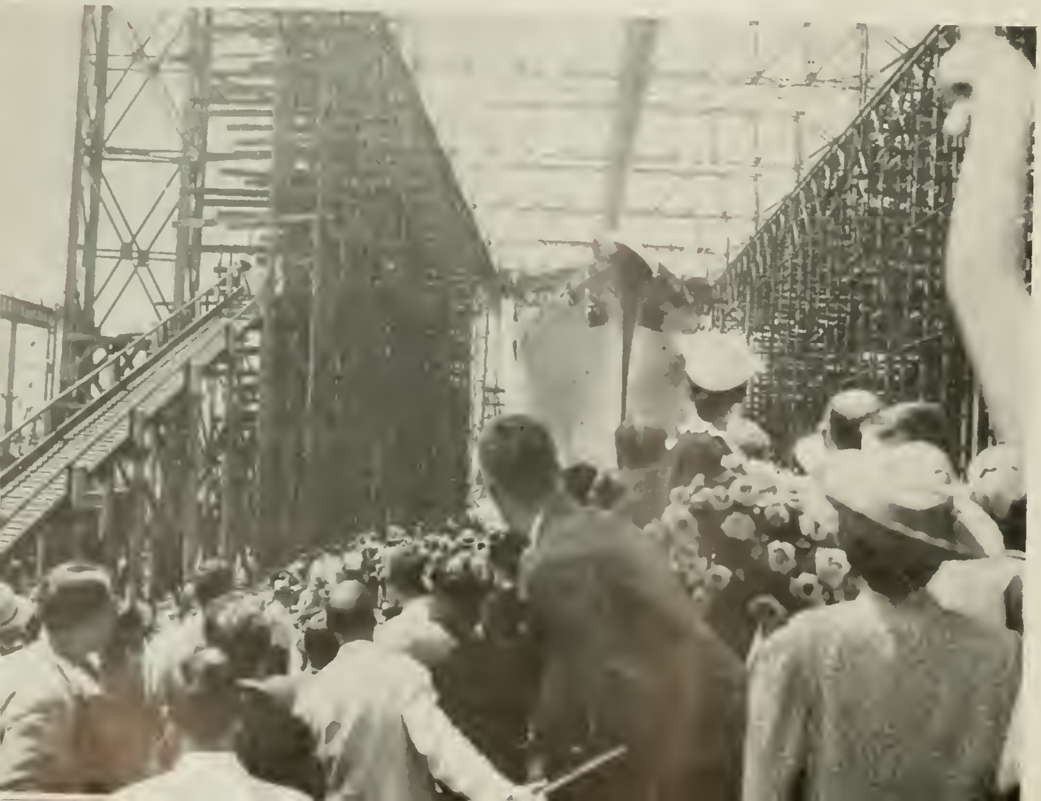
The Largest and Finest American-built

In October, 1937, the Maritime Commission placed a contract with the Newport News Shipbuilding and Dry Dock Company for a cabin class transatlantic passenger liner to operate with Manhattan and Washington in the New York-Channel Ports-Hamburg service of the United States Lines. The design of this ship was the result of three years' work on various proposals for such a liner, and is considered by many experts to be the most advanced yet produced in America for this type of ship.

On August 31, at 11:50 a. m., before a large and enthusiastic group of the nation's leading political figures, shipping magnates, shipbuilders and business executives, the nation's leading lady, Mrs. Franklin D. Roosevelt, sponsor, supported by Mrs. Emory S. Land and Mrs. Basil Harris, matrons of honor, broke a bottle of California champagne over the bows and christened her "America" as this ship slid gracefully down the greased ways to float proudly on the waters of the historic James River.

Taking part in the exercises preceding the christening and launching were: Rear Admiral Emory S. Land, retired, chairman of the Maritime Commission; John M. Franklin, president of the United States Lines Company; and Homer Ferguson, president of the Newport News Shipbuilding & Dry Dock Company. After the launching several hundred of the guests were entertained by the yard officials at a luncheon at Hotel Chamberlin, Old Point Comfort.

This big liner being of nation-wide interest, the exercises, which began about 11:15 a. m., were broadcast from coast-to-coast over NBC, CBS and the Mutual networks.



Much careful design and construction work is involved in launching a vessel of this size, and there is always considerable risk of some detail going wrong at the last moment, with possibly great damage to the ship and the launching crew. However, the personnel at Newport News is both experienced and careful in all of the factors necessary to a successful launching, and America's christening party and maiden dip were effected on schedule time and very smoothly.

The requirements of the contract call for a hull built and equipped to conform with: all the applicable laws and regulations of the United States: the requirements of the American Bureau of Shipping, permitting highest classification as an ocean-going passenger liner; the rules of the Bureau of Marine Inspection and Navigation; the stipulations of the Navy Department; the full requirements of the International Load Line Convention and of the International Convention for Safety of Life at Sea; and all of the specifications of Senate Report No. 184.

The positive metacentric height in light condition is to be not less than 0.75 foot. Fourteen main transverse bulkheads provide three-compartment subdivision.

This design will maintain, in all conditions between metacentric heights of 5.4 feet (fully loaded) and 0.75 foot (light ship), sufficient stability without the use of ballast: to

Merchant Ship Takes the Water at Newport News

First Passenger Liner of the U. S. Maritime Commission

rovide positive static stability for
hree-compartment flooding; and to
imit the static list to 15° for two-
ompartment flooding and to 20°
or three-compartment flooding.

In ventilation, air conditioning,
ire proofing, fire detection and ex-
inguishing, and in emergency
afety equipment, this design is
cknowledged to be "The World's
Safest Ship."

Total cost of America will approx-
mate $17,000,000. Of this cost, over
11,000,000 will go to wages, divided
bout equally for shipyard labor and
or labor in the fabrication of mate-
ial and equipment outside the ship-
ard. Over 1200 American firms
ave received orders for supplies and
quipment to be used in this ship.
The plants of these firms are located
n at least 20 States of the Union.
From Minnesota to Louisiana and
rom California to Maine, the length
nd breadth of the nation feels some
hrob in the pulse of its industry
hrough the building of this one ship.

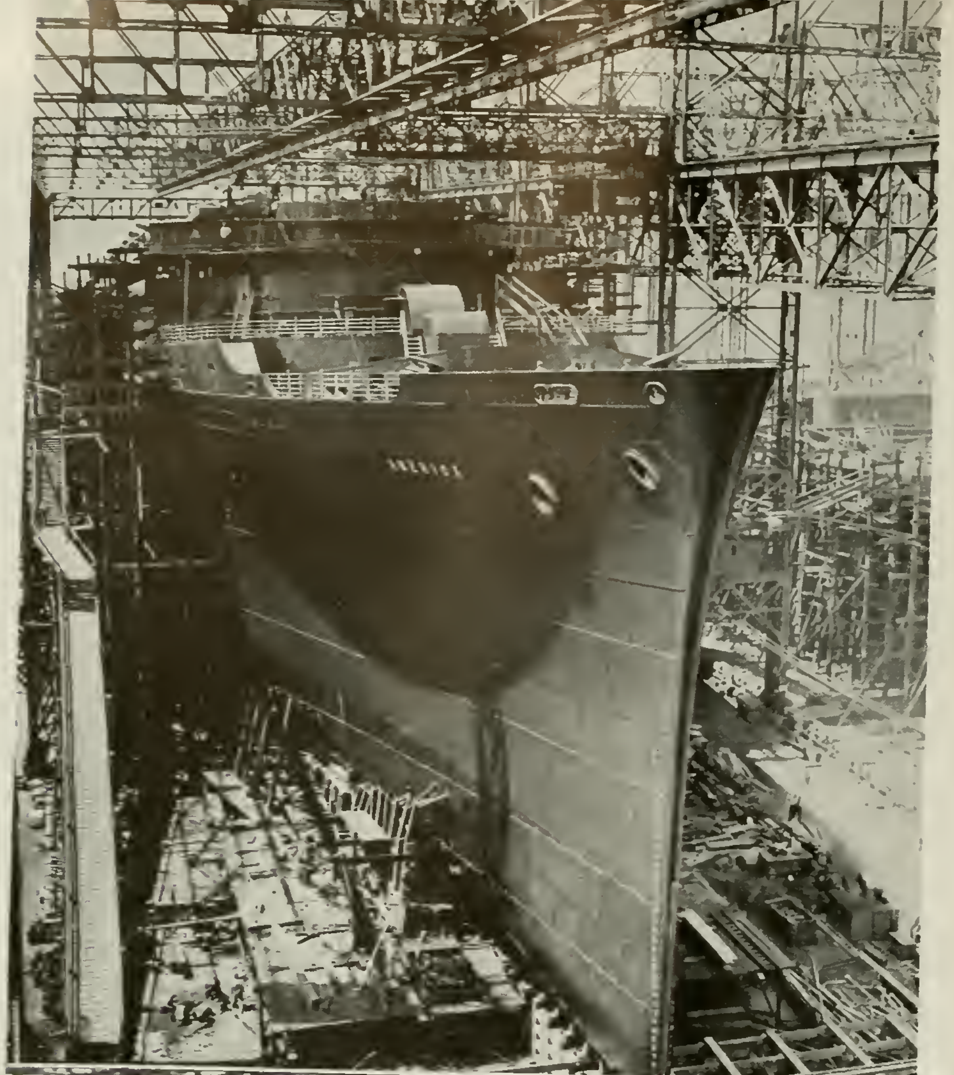
Her keel was laid on August 22,
938, Admiral Emory S. Land, chair-
nan of the U. S. Maritime Commis-
sion, driving the first rivet. At the
ime of her launching, some 19,000
ons of steel and other materials had
been fabricated and built into her
ull. Over 2,400,000 rivets were re-
quired for securing the joints of hull
members.

The following statistical facts are
interesting:

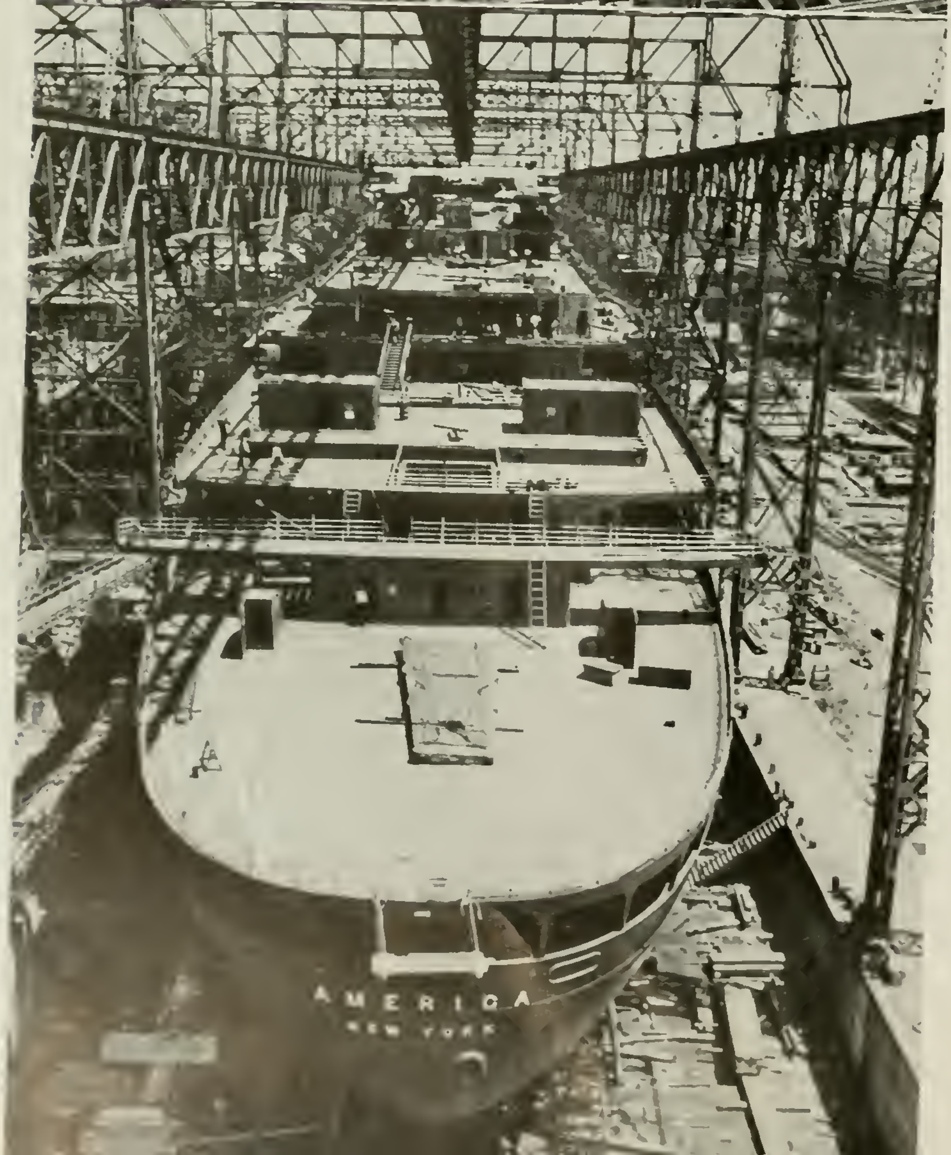
There will be four anchors—two
of 21,500 pounds weight each, one of

PRINCIPAL CHARACTERISTICS PASSENGER LINER AMERICA

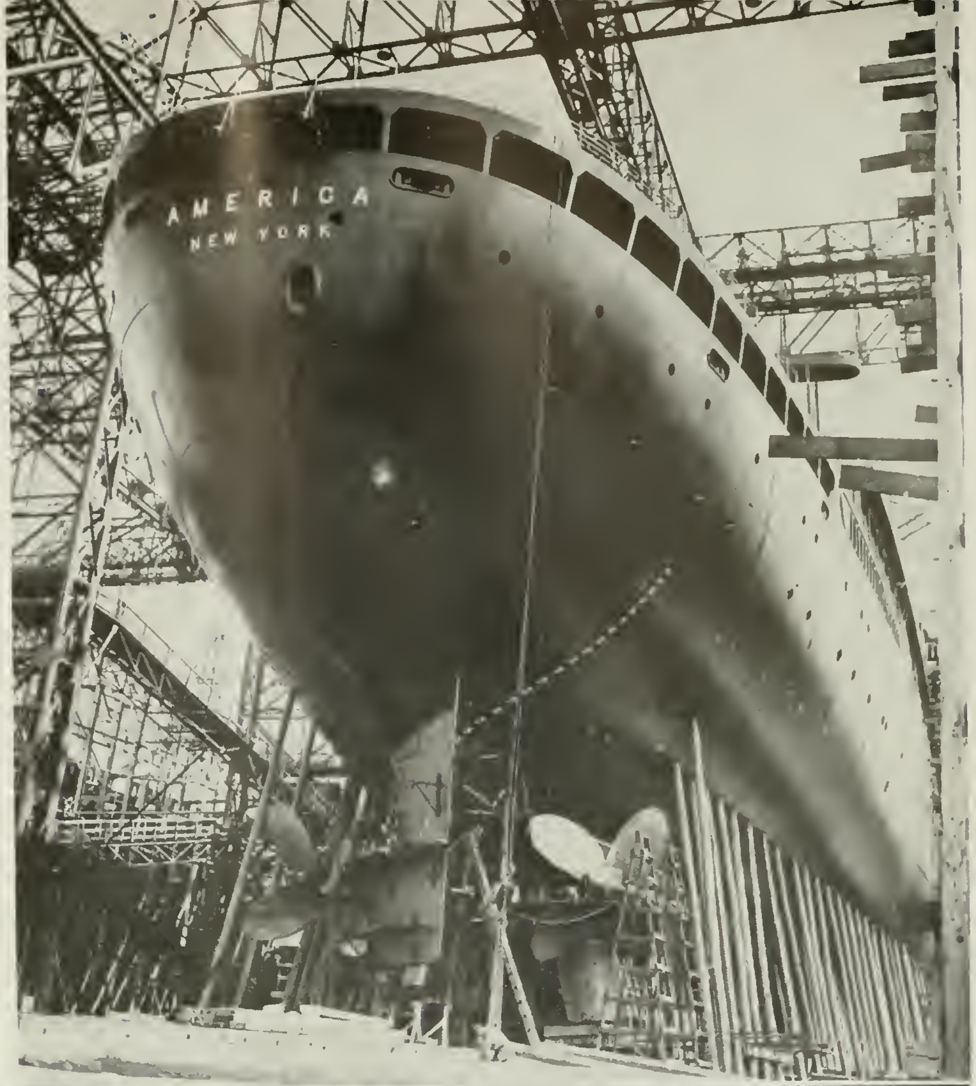
Length overall	723 feet 0 inches
Length, load waterline	689 feet 0 inches
Length between perpendiculars	660 feet 6 inches
Beam molded at load waterline	90 feet 6 inches
Beam molded 24-foot waterline	92 feet 0 inches
Depth molded to A deck at side	45 feet 4½ inches
Draft scantlings, floodings, etc.	32 feet 0 inches
Load draft (keel)	32 feet 3 inches
Weigh light ship, estimated	21,970 tons
Total displacement at load draft	34,370 tons
Deadweight at load draft	12,400 tons
Fuel oil capacity (97 per cent full)	4,550 tons
Fresh water capacity	4,125 tons
Shaft horsepower	34,000
Revolutions per minute (approximately)	128
Speed (approximately)	22 knots
Passengers	
First class	577
Tourist	409
Third class	233
Total	1,219
Officers and crew	635
Cargo bale capacity	334,000 cubic feet
Refrigerated cargo capacity	37,000 cubic feet
Baggage capacity	19,000 cubic feet
Dry stores	15,000 cubic feet
Refrigerated stores	31,000 cubic feet



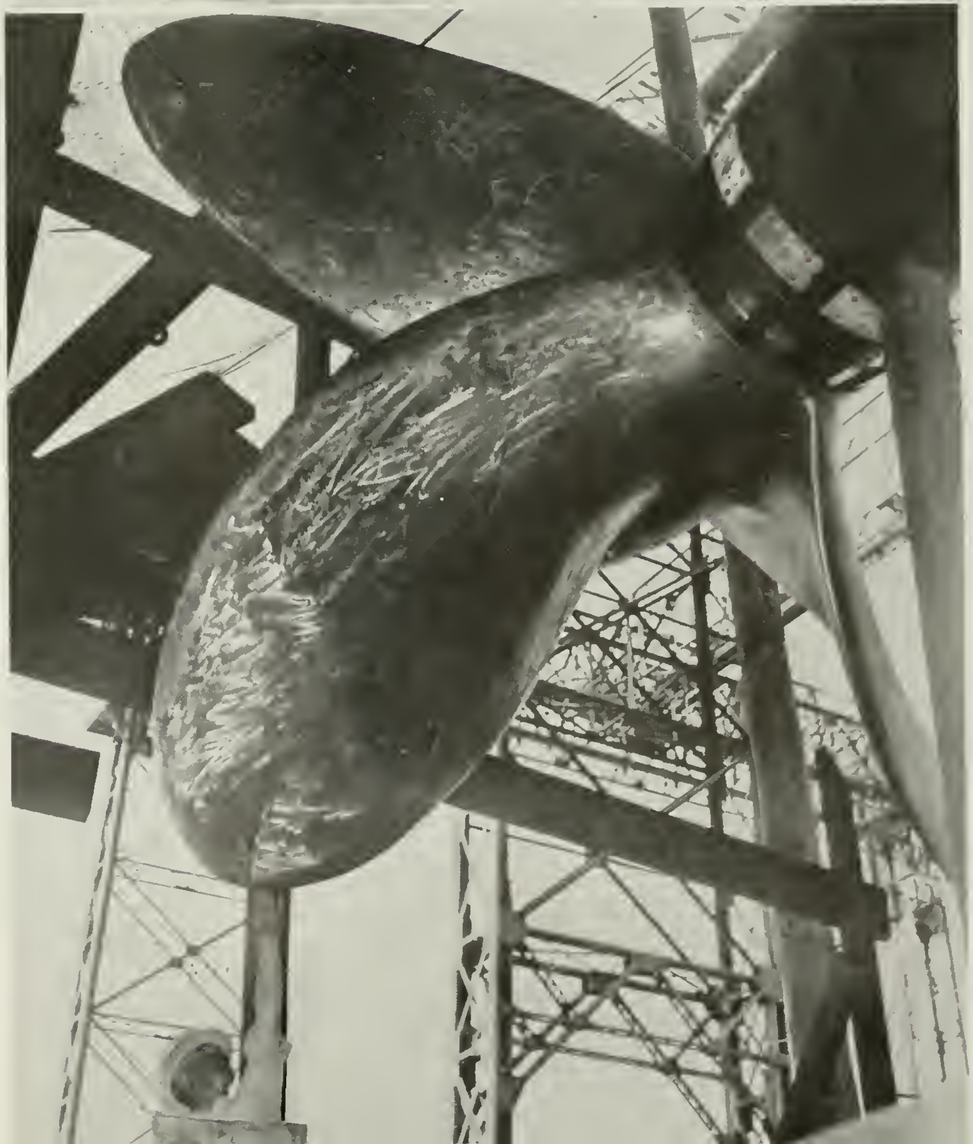
America's sharp, knife-like stem and easy concave run from bow to beam are designed for propulsive efficiency and for easy motion in a sea way. Her lovely flair lines promise a "dry" ship.



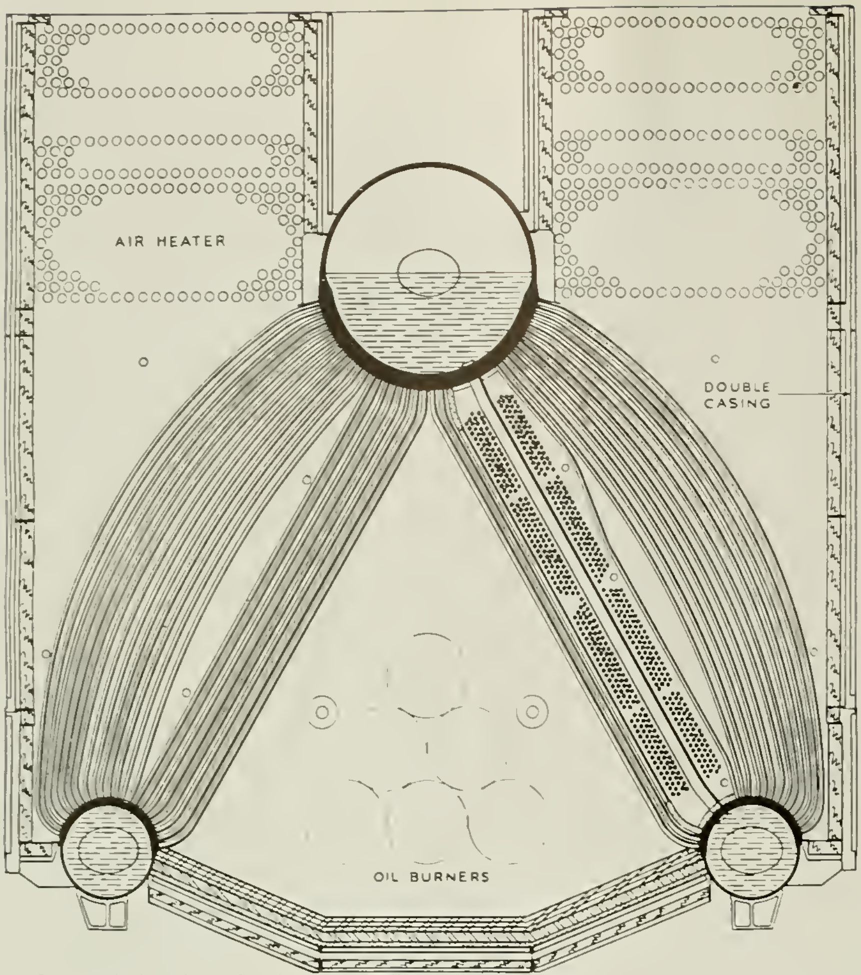
This view of the decks of America shows the stepped deck construction aft, which is typical of all modern American passenger liners. Like her line-mates Washington and Manhattan, America will have unusually large sport deck areas.



Viewed from below, the beautifully molded lines of America's stern promise undisturbed flow of water for the twin propellers that maintain her schedule speed.



Here is one of America's solid four-bladed bronze propellers. Turning at 128 revolutions a minute, these mighty screws will drive the huge hull at better than 22 knots.



Sectional elevation of Babcock & Wilcox Express type marine water tube boiler as installed on America.

18,000 pounds and one of 7,800 pounds; and four stud link anchor chains of 990-foot length; all supplied by the Baldt Anchor and Chain Company.

Her electric light, power and interior communication circuits will require nearly 14 miles of electric cable and wire.

Every stateroom in cabin and tourist classes has a connecting private bathroom, and every stateroom, including third class, will be fitted with a full-length mirror.

Over 400,000 square feet of Marinite, the Johns-Manville fireproof bulkhead material, will be used for partitions in crew's and passenger accommodation.

The entire promenade deck will be glass enclosed from deck to ceiling, with specially designed Kearfott windows giving an uninterrupted view of the sea, even when passengers are sitting in a deck chair.

Her lifeboats will be the largest Welin boats ever built in America. Boat equipment includes: two metallic motor-driven, radio-equipped boats that will have a capacity of 126 persons each; 8 metallic motor-drive boats that will take 145 each; four metallic lifeboats that will have a capacity for 99 persons each; and two special rescue boats with a capacity for 35 persons each.

A handsome tiled swimming pool will be installed, surrounded by a beach of "non-skid" tile.

Her galleys will be trimmed with one of the largest installations of stainless steel afloat.

● Propulsion Machinery

The main propelling engines of S.S. America will be housed in one engine room almost exactly amidships, and will comprise two sets of triple expansion turbines, each of which generates 17,000 shaft horsepower at a propeller shaft speed of 128 r.p.m. Each of these sets will consist of: a single flow high pressure turbine connecting to the propeller shaft through flexible coupling and double reduction gears; a single flow intermediate pressure turbine connected through a flexible coupling and single reduction gears; a double flow low pressure turbine connected through a flexible coupling and single reduction gears; and a high pressure astern turbine connected through a flexible coupling to the forward end of the intermediate pressure ahead turbine and exhausting into a low pressure astern element fitted in one end of the low pressure ahead turbine casing. The astern elements of each set of turbines are designed to develop approximately 10,000 S.H.P. at approximately 95 r.p.m. of the propeller shaft.

These turbines are being built by the shipbuilders. The gears connecting them with the propeller shaft are the product of the De Laval Steam Turbine Co., and are shown in the illustrations herewith. Each double main gear wheel, as illustrated, weighs 53 tons and has a diameter of 174 inches. Each main reduction unit weighs 114 tons complete with motor driven worm reduction turning over gear and incorporated Kingsbury type thrust bearing.

Operating speeds of turbines and gears will be: 3300 r.p.m. for the high pressure turbine rotor and its pinion; 1500 r.p.m. for low and intermediate pressure rotors and their pinions; and 128 r.p.m. for the main gears and the propeller shafts.

Each of the propeller shafts drives a 20-foot diameter propeller furnished by the Cramp Brass & Iron Foundries Co.

Steam will be bled from the main turbines for heating the feed water in two stages. The temperature of feed entering boilers will be about 300 degrees F. at full power. Bled steam will also be used when under way for the ship's heating system, fresh and salt water heaters, and the galley steam system. When main propulsion units are not operating, heating and galley steam will be supplied from the saturated steam system supplied by the high-pressure evaporators. There will be one main feed system consisting of one main feed tank, three main feed pumps, one drain cooler and two feed water heaters arranged in series. For port operation, there will be an independent feed system consisting of one feed tank, feed pump, drain cooler and feed water heater arranged in series.

The main condensers will be of the Worthington single-pass type provided with scoop circulation for speeds above 12 knots and with a turbine-driven centrifugal circulating pump for low speed and maneuvering. The condensing plants will be designed to maintain a vacuum of 29.0 inches (referred to 30 inches barometer) with circulating water at 65 degrees F. The condensers will be located below the low-pressure turbines and will automatically drain the turbines without the use of drain pumps or ejectors.

Steam for make-up feed will be supplied by two Griscom-Russell high-pressure evaporators at 125 pounds per square inch gage pressure to the high-pressure feed water heater, for the fuel oil heaters and fuel oil tank heating coils, and all reciprocating pumps except the emergency feed pumps, fire and bilge and fuel oil service pumps. Saturated steam for the emergency feed pumps, fire and bilge and auxiliary fuel oil service pumps will be supplied from the boiler drums.

All propulsion auxiliaries will be driven by electric motors, except the main feed pumps, auxiliary feed pumps, main circulating pumps and reciprocating pumps.

There will be four turbine driven, geared, 600-kilowatt direct current 120/240 volts, 3-wire General Electric generator sets with compensators. Generator sets will be arranged in pairs, both exhausting to a condenser capable of handling the steam from both units.

A 150-kilowatt marine type, compound wound, 120/240-volt, 3-wire direct current Westinghouse generator set driven by a high-speed General Motors diesel engine will be installed for emergency duty.

Steam will be supplied to this turbine plant by six Babcock & Wilcox boilers arranged three boilers abreast in two firerooms, one forward of and one aft of the engine room. The total steam capacity will be 315,000 lbs. for normal operation and 346,000 lbs. for maximum operation. These boilers are designed for a steam pressure of 500 lbs. and will operate with 425 lbs. and 725 deg. F. total steam temperature at the superheater outlet when supplied with feed water entering the drum at 300 deg. F.

The steamships Manhattan and Washington, now operated in the service in which the America will be placed, are equipped with Babcock & Wilcox Express boilers. The boilers on the steamship America will also be the Express type, oil fired, fitted with convection superheaters, horizontal tubular air heaters, and the boilers and air heaters will be completely air encased.

In this design each boiler is fired with six Babcock & Wilcox Decagon mechanical-atomizing oil burners, for operation with forced draft.

The furnace front and rear walls and floors are lined with Babcock & Wilcox refractory material. The lower drums are extended to the furnace floor, which eliminates furnace side walls, and is conducive to low furnace-maintenance. The burners are arranged with ample distance from all refractories and generating tubes to obtain satisfactory combustion conditions at all rates of operation.

The superheater for each boiler is situated in one of the boiler tube-banks and shielded from the radiant heat of the furnace by several rows of boiler tubes. The superheater headers are located at the rear of the boiler, within the casing, and any superheater tube can be removed from the front of the boiler, with the superheater in place.

Steam desuperheaters of the internal-drum submerged type furnish such low-temperature steam as may be required for auxiliary purposes.

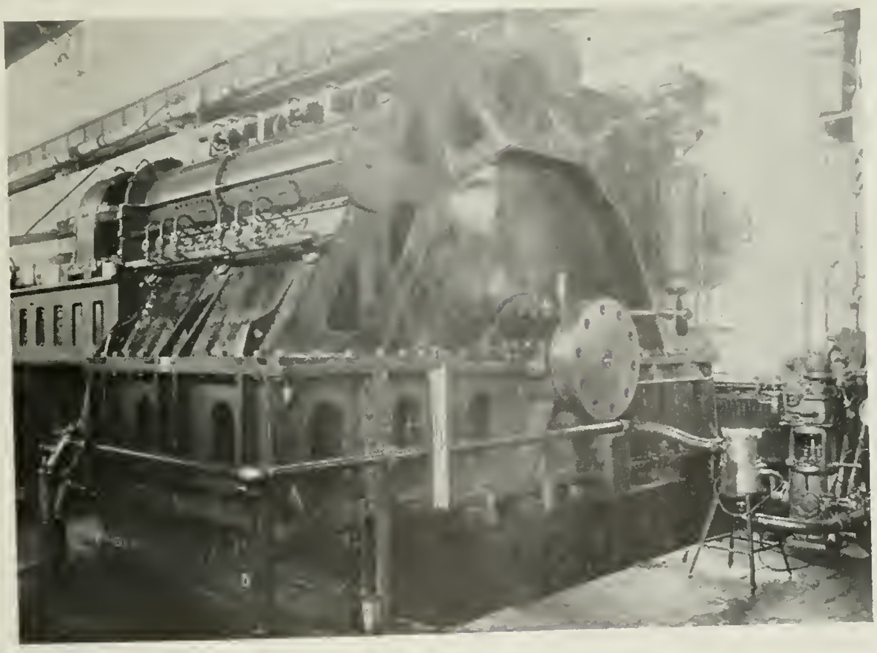
The air heaters, located above each tube bank, are of the horizontal tubular type having two passes for air and a single pass for gas. At the normal rate of operation, the gas temperature leaving the unit will be 300 deg. F., with over 88 per cent efficiency.

An insulated air casing surrounds the entire boiler and air heater, so that all of the air for combustion will pass around the boiler and through this casing before entering the burners, thereby reducing the radiation from the casing, improving the overall efficiency, and making a more comfortable fire room for the operators. With this arrangement, the boilers can be operated at all rates with only forced draft.

The feed water to the boilers is controlled by Bailey thermo-hydraulic feed water regulators.

The boiler, superheaters and air heaters are completely equipped with mechanical soot blowers of the Diamond Power Specialty Corporation's manufacture.

Fuel consumption for all purposes, based on fuel of 18,500 B.T.U. per pound, is not to exceed 0.634 pound per shaft horsepower output per hour of the main propelling machinery when developing 34,000 shaft horsepower average. A sea speed of about 22 knots is required.



One of the gear sets for reducing speed between the turbines and the propeller shafts of the America. This view taken on the test floor of the De Laval Turbine Company, makers of these gears.

Obligation of Ship Operators in Terminal Delivery of Cargoes

By H. C. CANTELOW

Secretary-Manager, Pacific Intercoastal Conference

The earliest function of the sailing vessel was to lift goods aboard from lighters at one place, float them to another place, and there lift them overboard to lighters or other small craft. The loading and discharging was performed at anchorages, the cargo being brought to or taken from ship's side by small craft at the risk and expense of the cargo owner. The ocean transportation rate was then earned, and the carrier's obligation was terminated as soon as this primary transportation function had been completed at the port of discharge.

The small craft was sometimes owned by the cargo owner but more often by firms or individuals engaged in the lighterage business and employed in that capacity by the various cargo owners. The ship's liability ended and the lighter's responsibility began when the goods had been removed from the cargo sling by the men employed by the operator of the lighter.

● Early Bills of Lading

Authors of early bills-of-lading took it for granted that the only service for which the vessel's freight rate was to be paid was the primary service of floating goods from one harbor to another harbor, and that the freight rate did not contemplate or include any services rendered before the cargo had reached the ship's tackle at port of loading or after it had been released from ship's tackle at port of discharge. This is indicated by the text of a bill-of-lading issued to my father in Boston when he was about to embark for California in 1849. That typical document of the time is interesting and instructive in more ways than one, and its brevity enables me to quote it in full, as follows:

> *Shipped, in good order and condition by William Cantelow, on board the good Brig called the Rodolph—whereof H. Walker is Master for the present voyage, now lying in the Port of Boston, and bound for San Francisco. To say:*
>
> *One Tierce*
> *One hf Bbl*
> *Two casks*
>
> *being numbered and marked as in the margin, and are to be delivered in like good order and condition at the aforesaid port of San Francisco (the danger of the seas only excepted) unto Wm. Cantelow or to assigns, he or they paying Freight for the said Goods, at the rate of $2.50 per barrel with primage and average accustomed . . .*
>
> *IN WITNESS WHEREOF, the Master of said vessel hath affirmed to two Bills of Lading, all of this tenor and date; one of which being accomplished, the others to stand void.*
>
> *Dated at Boston, January 27, 1849.*
> *Signed Hartwell Walker*

That is all there is to it. This brief contract seems to have well served the simple needs of carrier and shipper alike until as recently as ninety years ago. I have no record of what it then cost the shipper to lighter goods to the Boston anchorage or from anchorage to shore on arrival in San Francisco Bay, but there is historical basis for the statement that San Francisco lighterage charges often exceeded the cost of freighting from Boston around Cape Horn to San Francisco.

● Carrier's Responsibility Clause

As time progressed, it became the universal practice to stipulate in bills of lading the precise point or time at which the carrier's liability for goods would commence and the point or time at which its responsibility would terminate. That was accomplished by the following typical clause:

> *The carrier's responsibility, as a carrier, shall not attach until goods are actually loaded and shall terminate without notice as soon as the goods leave the vessel's tackles at destination or other place where the carrier is authorized to make delivery or end its responsibility.*

As late as 1849 there was no demand for a definite bill of lading stipulation setting out that the agreed freight rate did or did not cover and include costs beyond ship's tackle, such as lighterage to and from vessel's anchorages. It would appear that all informed persons then knew that it was the function of the ship to float goods to the agreed port and the function of small craft to come alongside and float the goods to shore; that the two services were equally essential to the cargo owner and were separate and distinct services for which he should pay.

At a later date arguments arose which caused vessel owners to stipulate, in effect, that where the freighting contract said that goods were "to be delivered in the aforesaid Port of San Francisco" that did not mean delivery on shore or at any other point beyond the ship's tackle. Under some such circumstances the clarifying "ship's tackle" provisions to which I have referred found their way into bills-of-lading, in all countries and in all trades.

If my understanding is correct, I am to present to you the steamship owner's viewpoint as to whether, under present conditions, his obligation to the cargo owner ceases at the end of the ship's tackle or ceases when the cargo is landed at place of rest on dock. Stated in that way the answer would have to be, "that would depend upon the lawful bill-of-lading and tariff provisions applicable in each specific case." For example, the carrier may enter into a freighting contract under which the shipper agrees to deliver a quantity of sugar to vessel at ship's tackle and agrees that the consignee will take delivery at ship's tackle. In such circumstances the carrier would tender and complete delivery at ship's tackle, there earn its transportation rate, and there terminate its obligation and liability. The same may be said respecting a shipment of bulk copra or other bulk cargo discharged direct with ship's gear to a shipside hopper or conveyor. Likewise as to all cargo lowered directly to an open-top rail-car with ship's gear.

● Delivery of General Cargo

An entirely different situation arises when it comes to dealing in a practical way with a great assortment of general merchandise to be discharged at a public utility terminal from many hatches and properly segregated and distributed for later expeditions and orderly delivery to numerous consignees and on-carriers to be transported to various final destinations. A practical plan could doubtless be worked out whereby the vessel, in such circumstances, would perform only the service of breaking the various shipments out of the holds and lowering them to the floor of the wharf, the terminal operator, acting for the various consignees, picking the goods up there and handling them to piles for later delivery to consignees or on-carriers. That method would have to be authorized by suitable bill-of-lading and tariff clauses terminating carrier's obligation or liability at ship's tackle and establishing the status of the terminal operator as that of shipper's or consignee's agent. Delivery would then be complete and carrier's obligation would actually terminate at ship's tackle. As a matter of fact that is substantially the situation today at Havre and Antwerp and other world ports, but it is not the practice on this coast.

● Terminal Functions

It is too often thought that the deep-water terminal was evolved to meet a fundamental need of the vessel-owner. The reverse is true. The vessel's primary need has always been a safe anchorage with sufficient water under her and room in which to swing with the tides. The merchants found that they had two primary needs: first, vessels to transport their goods to and from world ports; second, convenient shoreside sheds where their merchandise might be assembled leisurely and might be protected from the elements and thieves while awaiting arrival of the vessel for which intended; and where imports might be distributed in orderly piles for later removal at intervals convenient to the several consignees.

I do not wish to be understood, however, as holding that shipowners have not benefited by the evolution. Unquestionably the modern terminal better serves the purposes of both the shipowner and the cargo owner. Neither would wish to restore lighters in the ports from which they have disappeared. But I do wish to emphasize that the deep-water terminal was at the outset essentially a cargo-owner facility, as indicated by the fact that today cargo is lightered to and from anchorages at many ports around the world, and in tremendous total quantities. My point is that lighterage cost in such ports is borne by the cargo owner, and the vessel's cargo handling expense and liability begins or ends at ship's tackle.

● Obligation to Deliver Cargo

The United States Supreme Court has often held that the carrier's undertaking is not only to transport but also to deliver cargo to consignees, because transportation is not completed until the shipment arrives at point of destination and is there delivered. But it would be improper to infer from this that delivery is part of the service which *must* be rendered for the transportation rate. Those court decisions in no way suggest or support an inference that delivery must be effected by the carrier without any charge in addition to the transportation rate.

The shipowner has freely admitted his obligation to make a delivery or proper tender of delivery, since that is the very essence of his contract of affreightment, but he should always defend his right to distinguish between the service rendered in floating goods from place to place and any other services he may render goods on lighters or on terminals before they are actually loaded aboard the vessel or after they have actually left the vessel. His right to make such distinctions seems to be recognized by our Shipping Act of 1916. There we find a distinction drawn between rates and charges. We find that not only must the carrier's rates be just and reasonable, but his charges, regulations and practices relating to "presenting and delivering property for transportation and all other matters relating to or connected with the receiving, handling, transporting, storage or delivery of property" must be just and reasonable. In view of the language employed by the Congress, pertinent parts of which I have just quoted, it is difficult to understand how the administrative body could properly challenge the right of the carrier to establish a just and reasonable rate for transporting goods from ship's tackle at one port to ship's tackle at another port or the right to establish a separate, just and reasonable charge for picking up the goods at the point at which they have been received on terminal "for transportation" and "handling" them thence to ship's tackle, or vice versa. The law, reasonably construed, recognizes that neither "storage" nor "handling" is "transportation."

There are several good reasons for such distinctions in the law and in actual practice. The controlling reason seems to be that the shipowner has no voice in shaping the policy of a given city, state or country respecting labor relations, working hours, policing and the like, and usually no ownership in or final control over the many marine terminals served by his vessels or the differing schedules of charges there assessed against his vessel and against cargo. The reverse is true when it comes to the transporting vehicle. The management of the ship is completely vested in her owner. Based on experience, he can estimate her operating costs from voyage to voyage with reasonable accuracy and he controls his basic freight rate-making policy. It is therefore only a part of good management for the shipowner to restrict the services to be performed at his expense, in re-

(Page 56, please)

Mrs. Joseph R. Sheehan swings a lusty right on the nose of Sea Arrow.

A Ship is Launched

Moore Dry Dock Co. C-3 Type Vessel in Promptly Lays Keel

On September 15 the ship-minded citizens of San Francisco and Oakland turned out en masse and thronged the plant of the Moore Dry Dock Company to witness the first launching in the new Pacific Coast shipbuilding boom.

The vessel to be launched was in many ways a symbol pointing to the revival of the shipbuilding industry on this Coast. For eighteen months the Chambers of Commerce and the press of the Pacific Coast had been hammering away at the U. S. Maritime Commission to make that agency award some work to Pacific Coast shipbuilders.

Then one Pacific Coast shipbuilder, Mr. Joseph A. Moore, went back to Washington, sharpened his pencil, sat in with the Commission and presently came back with an award for two C-3 cargo vessels at a price fixed by the Commission and much below his estimated costs. Arriving home, Joe took off his coat and went to work. So did every man in his organization. Figuratively, their coats are still off. The results are: a fine hull, approved by all official inspectors and ready for launching six weeks ahead of schedule; the steel for another hull 40 per cent fabricated; and a yard personnel in prime condition to erect the next ship in record time and to tackle any further contracts that may develop.

The crowd in the yard on the 15th caught the spirit of the place in many ways. A launching anywhere is always a festive occasion; in this yard it is a carnival. "Joe" Moore is a master, not only in shipyard management, but doubly so in acting as host to shipyard visitors.

Along the back of the administration building at Moore's is a nicely-kept garden of flowers and shrubs. On special days this garden becomes a combination game reserve and horticultural experiment station, concealing or revealing many curious and amusing specimens of the results of "cross breeding and grafting." Visitors are usually held here awhile, looking for new items in the "Moore zoo."

At this launching, however, the attention of everyone who came into the yard was immediately drawn to the hull on the ways by means of a simple and very effective method, which we believe is new. At least, it is a decided innovation so far as modern shipbuilding is concerned.

On the high bow, visible from many points in the yard, appeared a gigantic and very natural pair of eyes (see pictures). These had been painted over the plugged hawse pipes. So had "Joe" added another personal touch and made this launching "different." The eyes of the Pacific Coast were on Moore's yard on the 15th of September, but "Joe's" eyes were on everyone in the Moore yard.

A program of short addresses was broadcast over the yard and over a radio network. Included among the speakers were: Hon. Angelo J. Rossi, Mayor of San Francisco; Hon. Dr. W. J. McCracken, Mayor of Oakland; Mr. Joseph R. Knowland, California State Chamber of Commerce; former Senator William G. McAdoo, chairman of the board, American President Lines; Mr. Alfred J. Lundberg, president, Oakland Chamber of Commerce; Mr. Marshall Dill, president, San Francisco Chamber of Commerce; and Mr. Joseph R. Sheehan, president, American President Lines.

While these prominent citizens were orating, the launching gang was working, and promptly on the appointed time (12:45 p. m.) the big cargo carrier was ready for her initial dip. Mrs. Joseph R. Sheehan broke a bottle of California champagne on the sharp prow, pronounced the words, "I christen thee Sea Arrow," and the proud ship, with a lingering curtsy, as if loath to leave her sponsor, slid with quiet majesty into the waters of the estuary.

It was a beautiful launching, and the many spectators had a great thrill. Estimates of the crowd present varied from eight to ten thousand.

Immediately following the launching the employees staged several boxing and wrestling matches and a tug-of-war. Following this entertainment the Moore Dry Dock Company served lunch to 680 invited guests.

The Sea Arrow is a single screw cargo carrier of the design known as C-3 shelter deck type, steam turbine propelled. She and her sister vessel

A Keel Is Laid

Launches First Commission Program... For Sister Ship

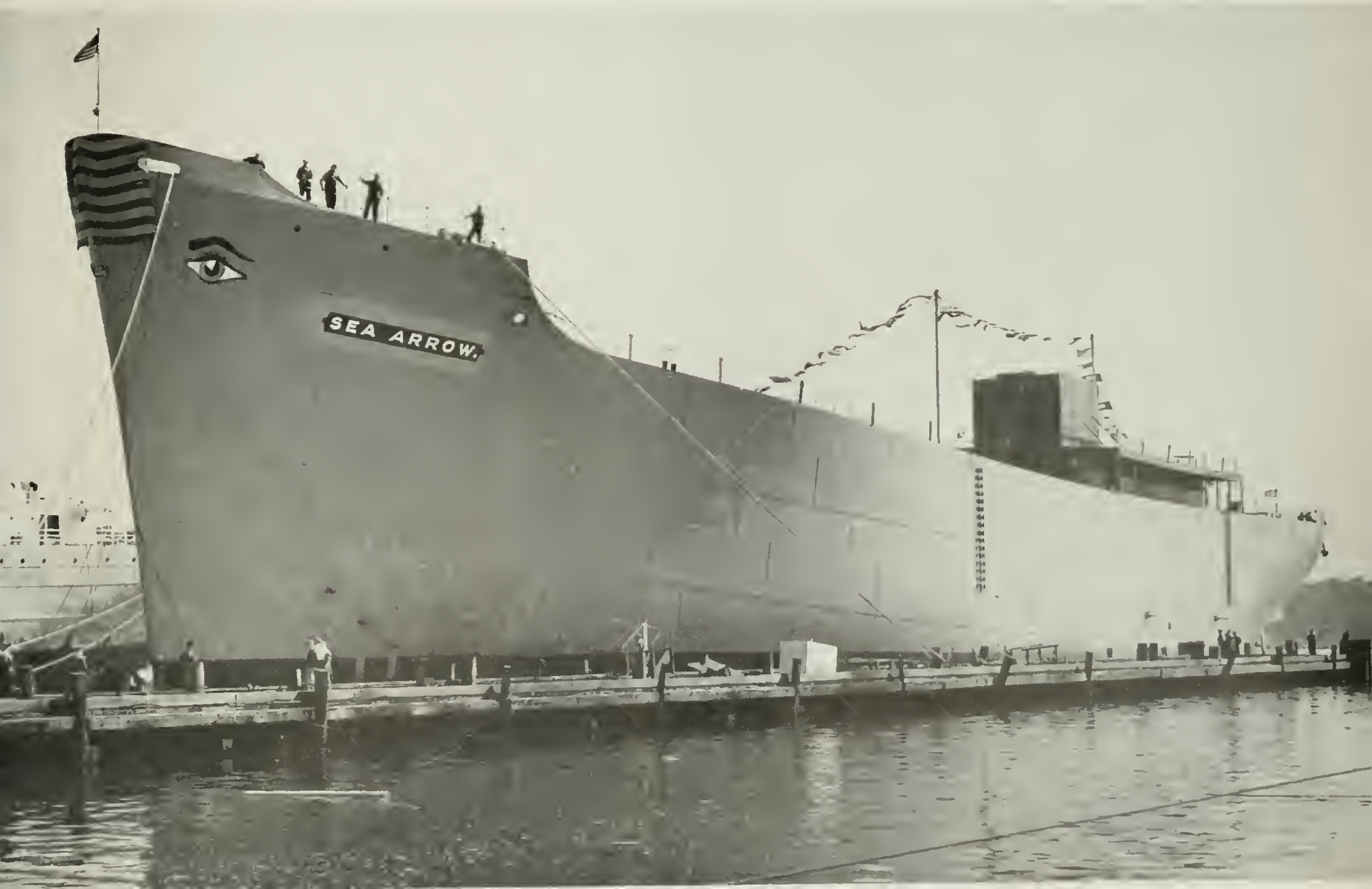
(keel for which was laid immediately following the launching) are being built for the U. S. Maritime Commission, and to date have not been officially allocated for any steamship line.

The Sea Arrow is the first to be launched of all the C-3 type on order in the shipyards of America. This is significant, as showing that this Pacific Coast shipyard is fully abreast of modern shipyard methods. The next hull will be assembled and erected in much less time than was taken for the Sea Arrow.

Such a successful construction

Mrs. Joseph R. Sheehan, sponsor; at right her husband, "Joe" Sheehan, popular president of the American President Lines; and at left Joseph A. Moore, master shipbuilder.

Below: Sea Arrow at dock just after her launching. Note the inescapable eye. This vessel, with her 8000 horsepower and 16½ knots sustained sea speed, will be a very valuable addition to the American merchant marine.



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Many notables took part in the program. Here, at the "mike," left to right, are: Former Senator McAdoo, chairman of the board, American President Lines; Mr. Joseph A. Moore, master shipbuilder; and Marshall Dill, president, San Francisco Chamber of Commerce.

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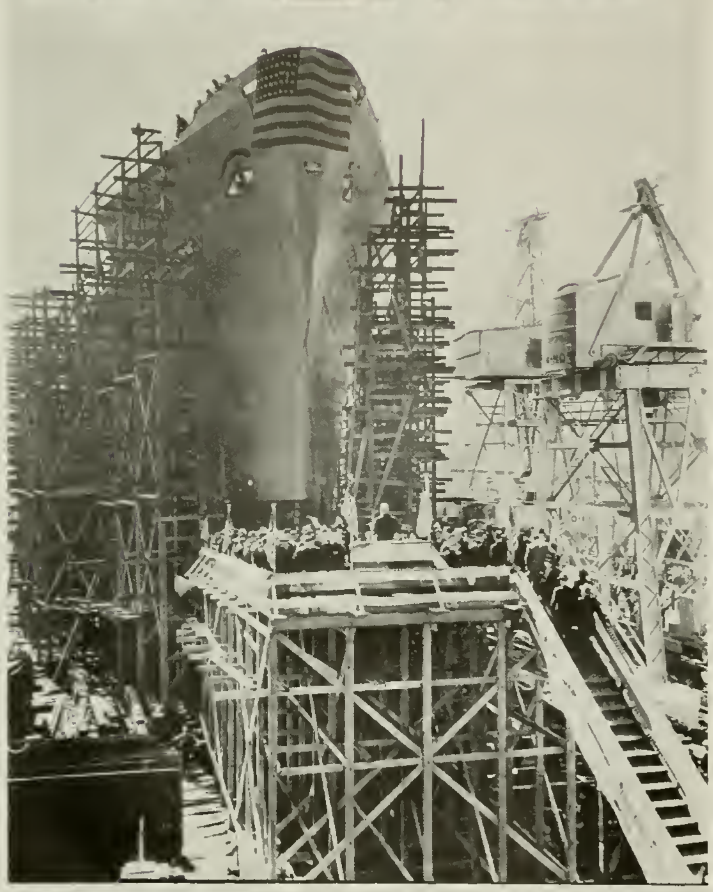

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The eyes of Sea Arrow gazed unblinkingly at everyone in the Moore yard on September 15. Here she is ready for launching. The crane at right, marked No. 2, is the Clyde Whirley standing by to lay the keel plate for the second C-3 immediately following the launching of the first.

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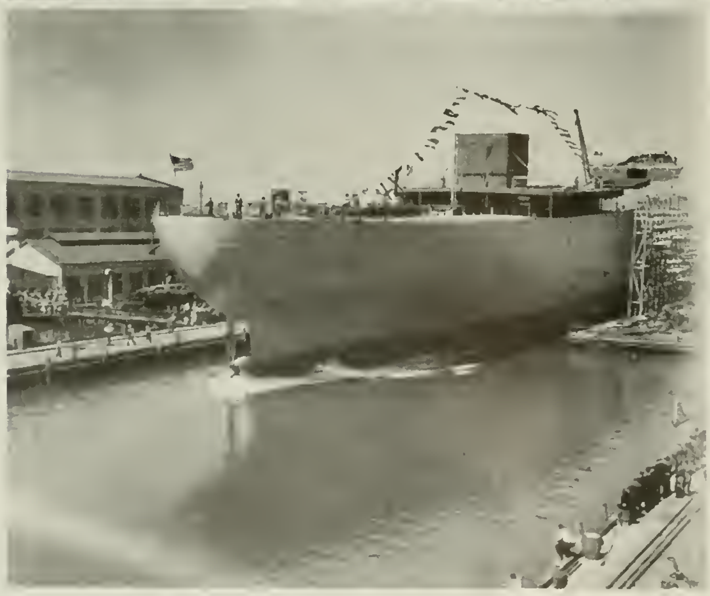

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As illustrated here, the stern of Sea Arrow slid very gracefully into the peaceful waters of Oakland's inner harbor, a promise of good propulsive efficiency for this fine hull.

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Principal Characteristics, C-3 Freighters

Length overall	492' 0"
Length B.P.	465' 0"
Beam molded	69' 6"
Draft, full load, molded	28' 7½"
Prismatic coefficient	.68
Full load displacement	17,600 tons
Deadweight, approx.	11,920 tons
Cargo deadweight	9,860 tons
Light weight of vessel	5,680 tons
Depth molded to shelter deck	42'6"
Height 2nd to shelter deck at side	9' 0"
Height 3d to 2nd deck amidships	11' 9"
S.H.P. Normal	8,500
S.H.P. Maximum	9,350
Speed—sustained at 27' 3" mean draft	16½ knots
Radius at 16½ K, about	12,000 nautical miles
Crew, approximate	45
Gross tonnage, approx.	7,680 tons
Net tonnage, approx.	4,550 tons
Passenger capacity	12

record undoubtedly has had its influence on the attitude of the U. S. Maritime Commission toward Pacific Coast yards. Four factors are principally responsible for this record, and we would place them in this order:

(a) A live, smooth-working organization of experienced personnel.

(b) A plant well equipped for working ship steel.

(c) The "Unionmelt" welding process.

(d) Ample lifting devices for handling large welded assemblies.

There was much welding experience in the Moore yard before this contract was awarded. In ship repair and structural steel fabrication this yard has done a lot of welding. However, the "Unionmelt" process was something new in the shipbuilding business on the Pacific Coast, although it had its original development here in steel pipe welding. The portable "Unionmelt" process welding machines which the Moore Dry Dock Company decided to use were a new development of The Linde Air Products Company. Fortunately, the inventor of the process, Mr. H. E. Kennedy, and his staff of research engineers, were available to iron out the kinks, and in a very short time the welders at Moore's were experts in using these machines.

The yard had a fair complement of shipyard cranes. These were supplemented by a big "Clyde Whirley," capable of handling alone weights up to 50 tons. This big gantry tower in combination with other cranes in the yard, enables the operator to lift, reverse, transport and spot weights up to 60 tons in sizes up to 35 feet in height and 70 feet in width.

Complete welded assemblies of bulkheads with stiffeners or of tank tops with all floors and intercostals attached (in weights up to 55 tons) are swung into place, spotted and temporarily fastened in less time than it takes to tell about it.

Washington now knows that Pacific Coast master shipbuilders can manage Pacific Coast workers in Pacific Coast shipyards in such fashion as to produce hulls comparable with those produced in any shipyard, and produce them with at least equal dispatch, and the demonstration of this was made in building not the smallest but the largest size of dry cargo carrier designed by the U. S. Maritime Commission.

Marine Steam Economy Record

The steam power plants of the Maritime Commission C-2 standard design ships now building in the Federal Shipbuilding and Dry Dock Company plant at Kearny, N. J., are turning in on trials almost unbelievable fuel economy figures.

On June 26 the Challenge, first of six sister vessels, ran a six-hour economy test outside New York harbor and made a fuel rate of .553 pounds per shaft horsepower hour for all purposes. Although this was generally accepted as a world record, some questions as to accuracy were raised, and the Maritime Commission decided to give the next ship, Red Jacket, a navy standard trial at Rockland, Maine.

Starting on Monday, the 21st of August, this ship was carefully put through all her paces under the supervision of experts. Carefully calibrated precision meters and instruments were used to determine power delivered, fuel consumed, water converted into steam, temperatures, fuel B.T.U. content and all the other factors that enter into a comparative economy test.

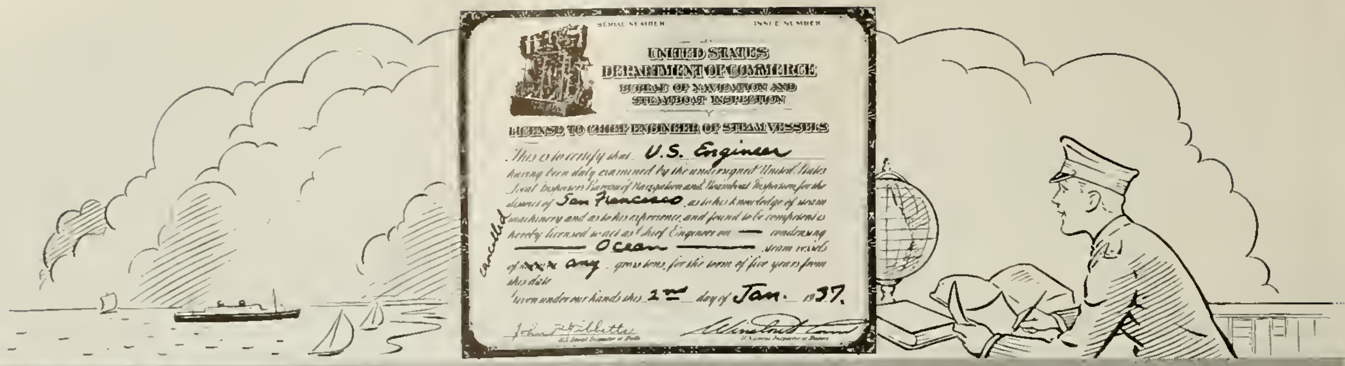
Based on fuel of 18,500 B.T.U. per pound, these tests showed a fuel consumption under trial conditions of .545 pounds per shaft housepower for all purposes.

We believe this figure to be a world's record in fuel economy for a cargo vessel, and we congratulate all concerned. Combined in this plant are all of the science and technique that have been developed in recent years by the research and engineering staffs who are responsible for: General Electric marine propulsion turbines and reduction gears; Foster-Wheeler marine steam generators; Todd oil burners and air registers; De Laval electric auxiliary turbines; Crocker-Wheeler generators; and for such important items as condensers, feed pumps, feed water heaters, evaporators, steam traps, air ejectors and condensate pumps.

Our hats are off to all of these, but we wish here to make special mention of a factor in the success of such plants that is not always appreciated by the layman. We refer to the marine engineering department of the shipyard itself.

W. W. Smith, chief engineer at Federal, for years an enthusiastic advocate of higher pressures in marine steam plants, has here demonstrated that he and his staff are masters in the art of applying steam power to marine propulsion.

With Mr. Smith, we shall be keenly anticipating another economy record when the 1200-pound steam pressure job which Federal is to build comes on for trial in 1940.



SERIAL NUMBER ISSUE NUMBER

UNITED STATES
DEPARTMENT OF COMMERCE
BUREAU OF NAVIGATION AND
STEAMBOAT INSPECTION

LICENSE TO CHIEF ENGINEER OF STEAM VESSELS

This is to certify that U.S. Engineer having been duly examined by the undersigned United States Local Inspectors Bureau of Navigation and Steamboat Inspection for the district of San Francisco as to his knowledge of steam machinery and as to his experience, and found to be competent is hereby licensed to act as Chief Engineer on — condensing — Ocean — steam vessels of xxx any gross tons, for the term of five years from this date

Given under our hands this 2nd day of Jan. 1937.

Cancelled

U.S. Local Inspector of Hulls

U.S. Local Inspector of Boilers

Your Problems Answered

by "The Chief"

"The Chief's" department welcomes questions—Just write "The Chief," Pacific Marine Review, 500 Sansome Street, San Francisco, California.

The New Examination Requirements for Engineers' Licenses

The Bureau of Marine Inspection and Navigation announces currently that a change in examinations for engineers will be put into effect about the first of January, 1940.

When the methods and plans that are now being formulated are completed, it is proposed to have sets of examination papers, compiled at the Bureau in Washington, sent to the 48 field offices under seal. These seals will not be broken until the candidates are assembled for examination. New and drastic rules have been drawn up and will be enforced for the conduct of these examinations. Every effort will be made to have these examinations conducted on the best possible lines so that they will give the candidates a fair and equal opportunity, with favor to none. Under this new system the examinations on any day at any port in the United States and its possessions will be identical.

It is the Bureau's ultimate aim that, after checking by the Examiners at the centers, the papers will be returned to Washington for final grading and review by a special staff to ensure equal standards in marking. The standards will be so high as to refute any claim that the examinations are not at least the equal of any foreign maritime power or inconsistent with the responsibilities to be assumed by the candidates. After approval in Washington the candidate will be notified as to whether he has qualified to receive his license. The examinations will, of course, be rotated so that they will be different on every occasion and no candidate can possibly know beforehand the exact questions he may be required to answer, since the Examiner himself will not see the papers until the seal is broken before the assembled examinees.

In studying the syllabus set forth herein, it should be noted that, in the course of the next three years, it is intended to place more and more emphasis upon the theory as well as the practice of navigation and engineering, a thorough knowledge of the theory of navigation and engineering being most essential in order to make the best use of its practical application. The examinations will be stepped up each year in easy stages for the next three years, and will then be kept up-to-date with the professional and technical advances made by the industry. In addition, subjects now given in the higher grades only will also be given in the lower grades.

Mathematical proofs of formulae will not be required, but the truth of a formula should be demonstrated by means of a figure where possible. Prospective candidates should therefore study and become conversant with the fundamental technical ideas and processes required in their work at sea.

EXAMINATIONS REQUIRED FOR STEAM ENGINEER

Any applicant for a license as third assistant engineer, second assistant engineer, first assistant engineer, or chief engineer, of ocean steam vessels, shall be required to pass a satisfactory examination as to his knowledge of the subjects listed below.

Third Assistant Engineer:

1. Code of signals used between the bridge and engine room for working the engine.

2. Elementary mathematics and mechanical principles, problems relating to beams, pulleys and leverage, safety and relief valves, com-

putations of strains on boiler stays, strength of boiler seams, and piston rods, etc. (together with simple sketches illustrating same), capacities of bunkers and fuel tanks, consumption of fuel and stores and economical use of fuel.

3. A good working knowledge of his profession, and of the fundamentals of various forms of marine steam turbines, and all other types of steam engines and auxiliary machinery, including electrical machinery and installations, and a practical knowledge of upkeep of, and repairs to same.

4. Steam, heat, combustion, and smoke prevention.

5. The uses of the various gauges, meters, and instruments used by marine engineers, water analysis, etc.

6. Questions on boilers and fittings.

7. Free-hand sketches of engine and boiler parts and fittings.

8. Treatment of a hot bearing or piston rod, and avoidance of same.

9. Use of fire detecting and extinguishing apparatus, mechanical and chemical fire extinguishers, oxygen and gas-masks, fresh-air breathing apparatus, safety-lamps; precautions to be taken against fire or explosions from oil or gas, precautions to be taken against the formation of explosive gases in coal holds, oil tanks, etc.; causes of spontaneous combustion; rules in regard to storage of lubricating oils, gasoline for auxiliary lighting and wireless systems; and methods of dealing with fire.

10. Duties of an engineer at annual inspection of his vessel.

11. Rules and regulations of the Board of Supervising Inspectors.

12. Such further examination as may be required.

Second Assistant Engineer:

A fuller knowledge of all the subjects required for an examination as third assistant engineer, and in addition comprehensive problems, a good practical and theoretical knowledge of the construction, care and upkeep of boilers, the use and care of boiler fittings and mountings, particularly water gauges and safety-valves, the precautions to be taken when raising steam, and when opening stop-valves to admit steam to steam pipes, etc.

First Assistant Engineer:

1. Any or all of the subjects required for a second or third assistant engineer's examination, including more advanced problems.

2. Use and application of the indicator, calculation of mean effective pressure and horsepower from indicator diagrams, the interpretation of the indicator diagram; sketching of an indicator card showing by corresponding numbers the lead, steam line, point of cut-off, expansion curve, point of exhaust, exhaust line, counter-pressure line, exhaust closure, compression curve, atmospheric line and vacuum line.

3. Sketches of any part of the machinery.

4. Strength of boilers, pressure vessels and pipes, stress in shafting and other machinery parts, tests of same.

5. Questions and problems relating to electrical machinery and installations.

6. Characteristics of metals as related to steam propelling machinery, boilers, and fittings; information obtained by pulling material in a testing machine.

7. Care of bilges, bunkers, and tanks under the boilers, etc.

8. Upkeep of machinery, work to be done to the steam propelling machinery, boilers and auxiliary machinery, and the periodical examination of the working parts, work necessary upon laying up a vessel, or upon taking out a vessel which has been laid up, temporary or permanent repairs in the event of partial or total breakdown; the installation and fitting of machinery on board ship.

Chief Engineer:

1. An advanced and more complete knowledge of the subjects and problems required for a first assistant engineer's examination.

2. Statement of duties of chief engineer upon taking charge of the engine department of a steam vessel, and on the operation and management of the engineering department.

3. Fundamental principles of heat and power engineering.

4. Properties and combustion of fuels. Questions relating to the economical operation of machinery and the economical use of fuel.

5. Electricity and Refrigeration, in a more advanced form than required for the other licenses.

6. Particulars of actual casualties or breakdowns which the applicant has experienced at sea, or which have come to his knowledge, how they might have been prevented, and how they were remedied.

7. Dimensional working drawings of machinery parts. (Candidates will be required to bring their own instruments and drawing board.)

8. Applicable United States Laws Governing Marine Inspection.

EXAMINATIONS REQUIRED FOR MOTOR ENGINEERS

Any applicant for a license as third assistant engineer, second assistant engineer, first assistant engineer, or chief engineer, of ocean motor vessels, shall be required to pass a satisfactory examination as to his knowledge of the subjects listed below.

Third Assistant Engineer:

1. Code of signals used between the bridge and engine room for working the engine.

2. Elementary mathematics and mechanical principles, problems relating to beams, pulleys and leverage, safety and relief valves (together with simple sketches illustrating same), capacities of bunkers and fuel tanks, consumption of fuel and stores and economical use of fuel.

3. A good working knowledge of his profession, and of the fundamentals of oil, gas, or other internal combustion engines, and also the auxiliary machinery in use on board ship, including electrical machinery and installations, and a practical knowledge of upkeep of, and repairs to same.

4. Steam, heat, combustion, and smoke prevention.

5. The use of the various gauges, meters, and instruments used by marine engineers, water analysis, etc.

6. Questions on auxiliary steam boilers, evaporators and machinery, etc.

7. Free-hand sketches of machinery parts with which the applicant should be familiar.

8. Treatment of a hot bearing or piston rod, and avoidance of same.

9. Use of fire detecting and extinguishing apparatus, mechanical and chemical fire extinguishers, oxygen and gasmasks, safety-lamps,

fresh-air breathing apparatus; precautions to be taken against fire or explosions from oil or gas, precautions to be taken against the formation of explosive gas in oil tanks, bilges, or other unventilated spaces, causes of spontaneous combustion; rules in regard to the carrying of fuels, storage of lubricating oils, gasoline for auxiliary lighting and wireless system; and method of dealing with fire.

10. Properties of the various oils, etc., generally used in internal combustion engines.

11. Duties of an engineer at annual inspection of his vessel.

12. Rules and Regulations of the Board of Supervising Inspectors.

13. Such further examination as may be required.

Second Assistant Engineer:

A fuller knowledge of all the subjects required for an examination as third assistant engineer, and in addition a good practical and theoretical knowledge of the construction, care and upkeep of auxiliary steam boilers and machinery, and the various methods of supplying air and fuel to the cylinders of engines of different types; the construction of the apparatus for carbureting, atomising or gasifying the fuel; the means of cooling the cylinders, pistons, etc.; and the construction of air compressors, tanks, etc.

First Assistant Engineer:

1. Any or all of the subjects required for a second or third assistant engineer's examination, including more advanced problems.

2. Use and application of the indicator, calculation of mean effective pressure and horsepower, the interpretation of the indicator diagram.

3. Sketches of any part of the machinery.

Chief Engineer:

1. An advanced and more complete knowledge of the subjects and problems required for a first assistant engineer's examination.

2. Statement of duties of chief engineer upon taking charge of the engine department of a motor vessel, and on the management of engines and auxiliary steam boilers at sea.

3. Fundamental principles of heat and power engineering.

4. Properties and combustion of oils. Questions relating to the economical operation of machinery and the economical use of fuel.

5. Electricity and Refrigeration, in a more advanced form than required for the other licenses.

6. Particulars of actual casualties or breakdowns which the applicant has experienced at sea, or which have come to his knowledge, how they might have been prevented, and how they were remedied.

7. Dimensional working drawings of machinery parts. (Candidates will be required to bring their own instruments and drawing board.)

8. Applicable United States Laws Governing Marine Inspection.

The Bureau receives numerous inquiries from candidates for licenses, asking what books they should study in order to pass the examinations. Although it is not the present policy of the Bureau to recommend any specific textbooks, it is thought that a printed list of the textbooks in the library of the Examinations Section of the Bureau would be of use to intending candidates as a means of ascertaining the particular textbooks which they feel are most suited to their individual needs. The list of books herewith may be found useful for any candidate studying for his license.

Books for Engineer Officers:

Engineering Descriptive Geometry and Drawing, Bartlett and Johnson.

Practical Mechanics, McKenzie.

Arithmetical Guide for Marine Engineers (Brown's), Volume I, Second Class; Volume II, First Class; Thorne.

The Calculus, for Marine Engineers, Larkman.

Principles of Basic Mechanisms, U. S. Naval Institute.

Practical Mechanics, Barr.

Naval Machinery, U. S. Naval Institute.

Marine Engineer's Handbook, Sterling.

Marine Steam, Babcock and Wilcox Co.

Machine Shop Practice, Pratt.

Marine Engineering, Audel.

Mathematics and Calculations for Mechanics, Audel.

Engineer's Handy Book, Roper.

Questions and Answers for Marine Engineers, Roper.

Boiler Management, Armstrong.

Brown's Slide Valve for Engineers, Thorn.

Tod's Verbal Questions and Answers for Marine Engineers, Vols. I & II.

Verbal Notes and Sketches for Marine Engineers, Sothern.

B. O. T. Orals and Engineering Knowledge, MacGibbon.

Pictorial Drawing Book, MacGibbon.

The Marine Steam Turbine, Sothern.

Extra Chiefs' and Surveyors' Guide, Youngson.

Reed's Engineer's Guide.

Reed's Engineer's Handbook.

Reed's Hints to Engineers.

Marine Engineer's Pocket Book, MacGibbon.

Manual of Marine Engineers, Durant Dyson.

Heat Engines, Ripper.

Steam—Turbine Principles and Practice, Croft.

Naval Reciprocating Engines and Auxiliary Machinery, Barton-Stickney.

Steam Turbines, Meyers.

Marine Engines and Boilers, International Library of Technology.

Marine Diesel Oil Engines, Sothern.

Practical Marine Diesel Engineering, Ford.

Marine Electric Power, Newman.

Brown's Marine Electrician for Sea-Going Engineers, Larkman.

Elements of Electricity, Timbie.

Editorial Note:

This list of books is the recommendation of the Bureau of Marine Inspection and Navigation of the U. S. Department of Commerce. "The Chief" will be glad to advise as to a selection from this list or as to other good books not on this list. Just address your inquiries to "The Chief," Pacific Marine Review, 500 Sansome Street, San Francisco, Calif.

Steady as you go!

KNOWLEDGE IS THE STRAIGHT COURSE TO ADVANCEMENT

A Department for Deck Officers

By "The Skipper"

Questions Welcomed. Just Address "The Skipper," Pacific Marine Review, 500 Sansome Street, San Francisco, California.

New Deal for Deck Officers

Pacific Marine Review has completed arrangements with a well-known Pacific Coast shipmaster of broad experience and exceptional ability to carry on this department, beginning in the November issue. Under this new management the department "Steady as you Go!" will bring to American deck officers just the type of information they need to enable them to carry on in their present position with maximum efficiency and to go up for raise of grade examinations and tests with confidence.

In these troubled times no man can see far into the future, but certain it is that every man can improve the present and walk into the future with greater confidence by increasing his store of the knowledge pertinent to his path of progress.

Naval architecture, marine engineering, the science of navigation, the art of communication, the technique of stowage and care of cargo, are all in process of more rapid flux today than ever before in their long history.

Ships' officers are expected, and under the new examination orders effective January 1, 1940, will be required, to keep abreast of all these rapidly-expanding bodies of specialized knowledge.

Whether you like it or not you are all at school. It is entirely within your own initiative and determination to stay in the lower grades or to advance into the collegiate and post graduate divisions.

Speed and Distance

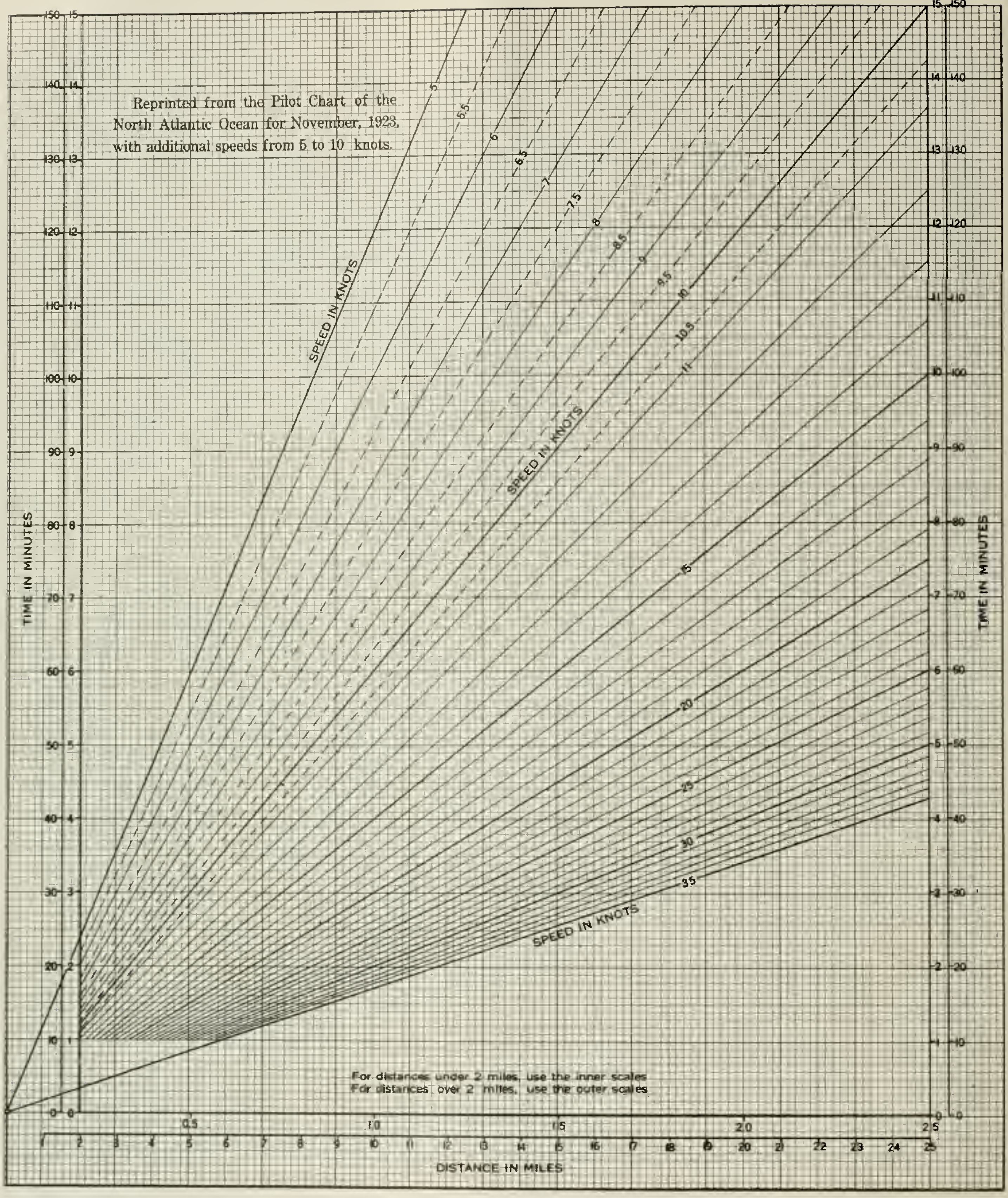
Once more the merchant marine services of the world are facing the submarine menace, and the convoy system will be in vogue. This will greatly enhance the value of quick determination of relative speeds and distances.

For that reason, we are reproducing in this section this month a pair of graphs from the U. S. Hydrographic Bulletin, which will be found very useful in checking these factors of safety. You can easily determine from these graphs just how far your vessel will travel in 10 seconds or 10 days, or in any interval of time at any given speed.

Deck Officers' Licenses for August

Name and Grade	Class	Condition
SAN FRANCISCO		
James E. O'Brien, Master	OSS, any GT	RG
Robert L. Downer, Master	OSS, any GT	RG
Nils J. Carlson, Master	OSS, any GT	RG
Elmer R. Eastman, Chief Mate	OSS, any GT	RG
Edgar S. Carlson, 3d Mate	OSS, any GT	O
Richard Fielding Downer, 3d Mate	OSS, any GT	O
SAN PEDRO		
Christian Olsen, 2nd Mate	OSS, any GT	O
Lawrence C. Olsen, 2nd Mate	OSS, any GT	RG
James Ring, 2nd Mate	OSS, any GT	O
George H. Lee, 3d Mate	OSS, any GT	O
Fred S. Sheppard, 3d Mate	OSS, any GT	O
Floyd A. Willett, 3d Mate	OSS, any GT	O
JUNEAU		
Hugh M. Campbell, Chief Mate	OSS & OMS, any GT	RG
PORTLAND		
David C. Crosby, Chief Mate	OSS & OMS, any GT	RG

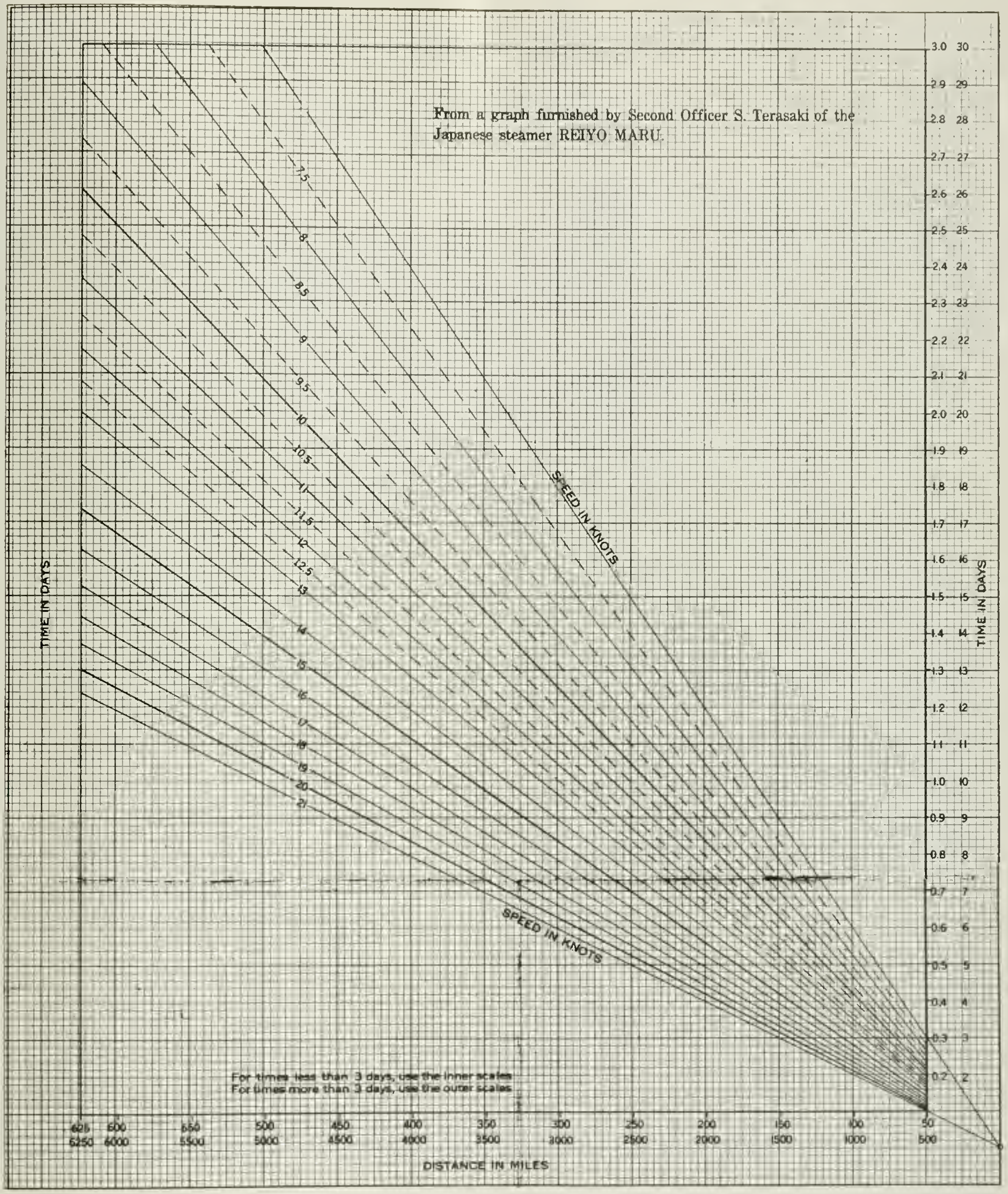
Abbreviations: GT is gross tonnage; RG is raised grade; O is original license; OSS is ocean steamer; OMS is ocean motorship.



Reprinted from the Pilot Chart of the North Atlantic Ocean for November, 1923, with additional speeds from 5 to 10 knots.

For distances under 2 miles, use the inner scales
For distances over 2 miles, use the outer scales

This chart is very handy for showing at a glance just how far any ship will travel in a small interval of time when her speed is anywhere from 5 to 35 knots. Check up your ship. How many feet does she go in 10 seconds when traveling at 10 knots? What is her speed on a slow bell? How fast can she accelerate? How fast can she stop?



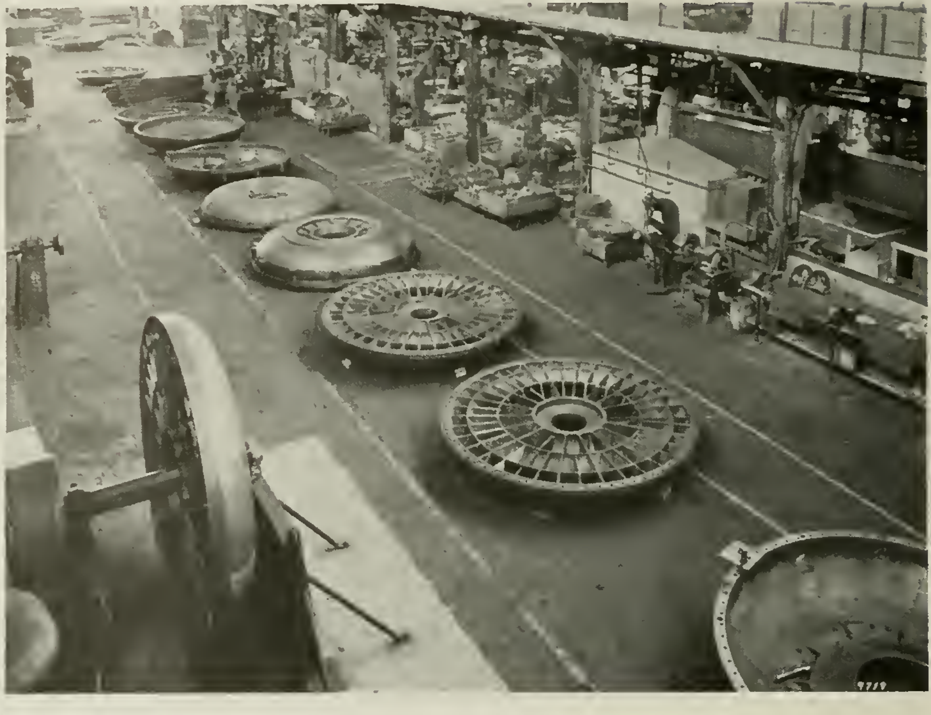
From a graph furnished by Second Officer S. Terasaki of the Japanese steamer REIYO MARU.

For times less than 3 days, use the inner scales
For times more than 3 days, use the outer scales

This chart is for time in days required to cover long distances. It covers speeds from 7 to 21 knots. Check your dead reckoning by this one.

The Marine Fluid Drive

Commission's C-2 Geared Motorships to be Driven Through Hydraulic Oil Couplings



The accompanying photograph, taken recently in the Russell Plant of the American Blower Corporation at Detroit, Michigan, shows hydraulic couplings under construction for C-2 Design Maritime Commission ships.

These couplings will be installed in ships being built by the Tampa Shipbuilding & Engineering Co. of Tampa, Florida, in connection with Nordberg Diesel engines and Falk reduction gears. Each coupling will transmit 3150 B.H.P. at an engine speed of 225 r.p.m. with a slip of 3 per cent using lubricating oil with a viscosity of 180 Saybolt Seconds at 130 degrees F.

The primary rotor, shown on the ways at the left, will be bolted to the engine crankshaft flange, while the secondary rotor, shown in the center, will be connected to the flange of the pinion shaft. The primary and secondary rotors face each other, but are separated by a gap of ¾ inch. The secondary rotor housing, shown at the extreme right, is bolted to and rotates with the secondary rotor enclosing the back of the primary rotor. Because there are no close clearances in the hydraulic coupling, extremely accurate alignment is not required.

The photograph shows the construction quite clearly. In operation the radially vaned primary rotor acts as a pump imparting kinetic energy to the fluid, which then drives the secondary element as a turbine. The circulation of the fluid between the two members is continuous, and results from the fact that the runner always runs at a slightly lower speed than the impeller. This difference in speed is referred to as slip.

In the Tampa ships, two engines will be connected to the propeller shaft through the hydraulic couplings and gears, and by emptying or filling the couplings one engine or the other can be connected to or disconnected from the load. Piston type quick dumping valves are provided in the periphery of the secondary rotor housing to permit emptying in approximately 15 seconds.

Much progress has been made in the application of hydraulic couplings in connection with geared diesel drive since the first ship of this type was placed in service in 1923, and today marine couplings transmitting in excess of one million horsepower are in service.

Preservation by Charring

Through the development of a formula by Carbon Chemical Products, Inc., it is now possible to char most any kind of material, including metal, concrete and asbestos, without the use of fire, for the purpose of waterproofing and preserving such material. Charring is probably the oldest method of preserving wood known to man. Charred objects of ancient civilizations have passed down to us perfectly preserved. It was this fact that suggested the idea for the new formula. The product is now being manufactured under the trade name Kar-Bon-Seal.

The base of this new product is charcoal obtained by burning hard wood to 800 degrees Fahrenheit. It has about the same consistency and coverage as paint, its color is black and it can be applied easily with a brush or a spray to concrete, brick, plaster, any kind of roofing, canvas, paper, metal and all types of wood and is non-poisonous and non-explosive. It will not burn the hands, is resistant to fire and common acids, such as sulphuric, muriatic or acetic, and is deterrant to the action of salt and termites.

After the product has been applied it forms a hard, permanently-

(Page 56, please)

A Notable *Marine Engine Overhaul*

One of the larger repair jobs recently completed at the 56th Street Brooklyn Yard of Bethlehem Steel Company, Shipbuilding Division, was a complete overhauling of the engines and the rebuilding of the crankshafts of the Furness, Withy & Company's Javanese Prince.

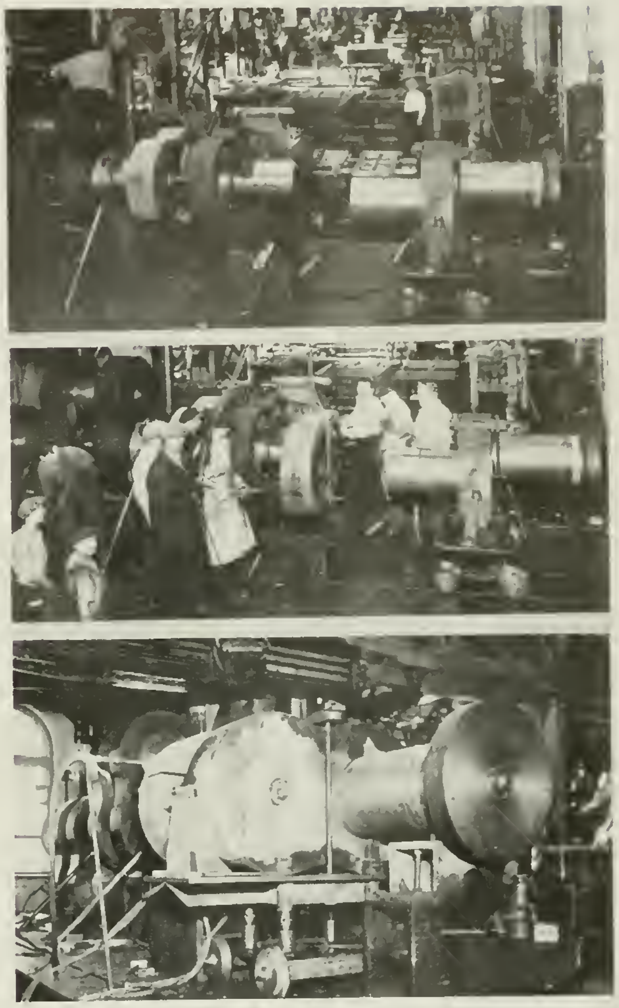
The Javanese Prince is a twin-screw vessel of 441.6 ft. overall length, with a 60.3 ft. beam, 29.2 ft. depth, and a registered deadweight of 6,734 tons. She is equipped with 4-cycle diesel engines of the single acting, blast injection type, with 29⅛ in. diameter cylinders and 47¼ in. stroke. Each engine has a capacity of 3,800 indicated horsepower at 125 r.p.m. They were built in 1926.

During the repair the ship was tied up at the outfitting pier, where a 25-ton stiff-legged derrick is available for handling heavy pieces in and out.

First the engines were completely dismantled, and the majority of the parts taken ashore for storage. Then the crankshafts were disconnected and transported ashore in their entirety. The bed plates and both compressor housings were lifted clear of the engine foundations to expose the crown plating.

Exposed sections of the foundation crown plates of both engines, together with fastening rivets, were renewed. The crown plates (four in number) were 24 ft. long, 30 in. wide, and 1½ in. thick.

To expedite the repairs, the starboard crankshaft was rebuilt at the company's Hoboken Yard. Three plain journals, two journal couplings (one for the compressor and one for the timing gear) and four crank pins were renewed on this shaft. Rebuilding of the port shaft, which was done at the Brooklyn 56th Street Yard, required the renewal of six plain journals and four journal couplings, one for the flywheel, two for the timing gear, and one for the compressor, all eight crank pins (18⅜ in. diameter) and the after web on No. 5 crank.



Assembling a large built-up crank shaft by shrink fit process.

Upper view shows two sections waiting for a crank web, which is being heated at the gas furnace in rear. Center shows this web in place and one of the T sections being brought up on shrinking carriage to connect. Lower view shows complete shaft ready for final machining of journals and crank pins.

The crank pins, journals, journal couplings and webs were all forged and rough machined at the company's Steelton Plant, and were tested by Lloyd's classifiers and surveyors.

All eyes of dismantled crank webs were lightly bored and finished to a dead smooth surface. Shrink fits of new pins and journals were smooth machine finished to the diameters giving the desired shrinkage, and plain dowels were pressed into all new journals in positions occupied by the originals.

Great care had to be exercised in assembling of the shafts. Owing to the short throw of the engine it was necessary to shrink one journal and one crank pin into each web simultaneously, to avoid distortion of the assembly. After the entire crank shaft was shrunk and assembled the journals and crank pins were machined in alignment.

One of the features of the repair was the machining of the crank pins in the lathe by means of a specially designed crank pin turning machine.

All lower half main crank shaft bearings were completely remetaled and bored in place. Finally the completed crank shafts were taken aboard, bedded in, and deflection readings were taken between the webs.

The engine repair included complete overhauling of all pistons, the ring grooves were machined, and a large number of rings were replaced. About one-fifth of the cross head pins were machined and the crosshead bearings were rebabbited.

A New *Anchor of Merit*

R. S. Danforth, well-known manufacturers' representative, and amateur yachtsman of San Francisco Bay, has devised a new type of anchor with remarkable holding power. This type, known as the Danforth Navy Anchor, has the following advantageous characteristics:

(1) Greater power per pound than any other known type of anchor.

(2) Ability to bury itself instantly in mud, sandy mud or hard sand, leaving no flukes or other projections to foul cable when ranging.

(3) Breaks out easily when lifted but will not become shod.

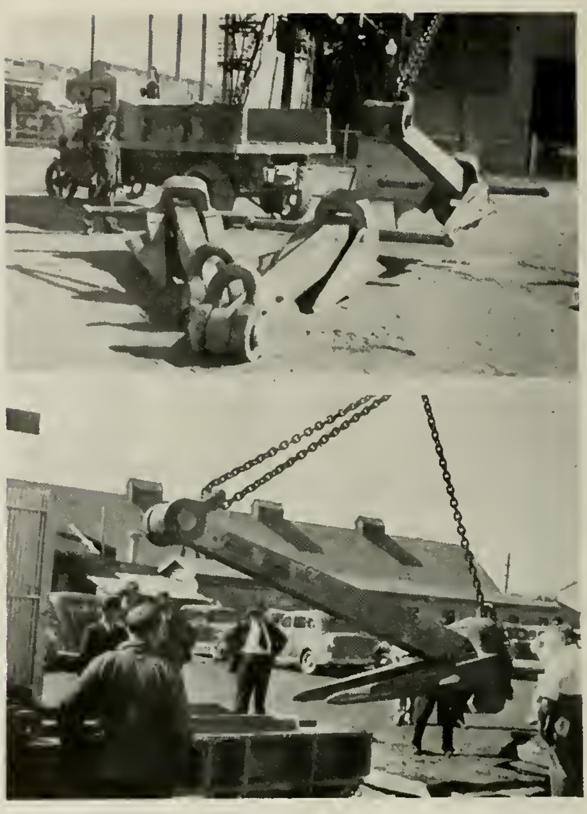
(4) Comes aboard without gouging the paint.

Table I herewith shows some results of tests of Danforth Navy Anchors under varying conditions.

TABLE I

Weight Pounds	Scope	Aver. Hold. Power	Hold. Power Per Pound
Southampton Shoal (Hard Sand)			
13	4.5-1	1250	96.2
30	4-5	3350	112.0
60	4.5-1	5000	No drag
Fine Sand off Marina			
95	4.5-1	7600	No drag
Fine Sand and Mud, Berkeley Yacht Harbor			
13	3-1	310	24
	7-1	615	47.2
30	4-1	1100	36.7
	6-1	1300	43.3
	8-1	1650	55.0
Soft Mud, Belvedere Cove			
13	4-1	150	11.8
30	4-1	400	13.3

The figures show much greater holding power than conventional type anchors tested under same conditions. Roughly, the comparisons show: 5 times the holding power of the ordinary Navy type in soft mud, 10 times in sandy mud, and 50 times in hard sand.



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Three 5-ton Danforth Navy anchors for the U. S. Army Engineers for use at New Orleans, La.

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So impressive were the tests that the U. S. Army Engineers ordered three 10,000 lb. Danforth anchors for use in a very tough anchor problem at New Orleans. The illustrations show these anchors, which were cast of alloy steel at the Columbia Steel Company plant at Pittsburg, Calif.

These large units were subjected to more than double the test strains required by classification societies for anchors of the size, were given a heavy drop test and a severe hammer test. No distortion of any kind was observed, and the three anchors were approved for shipment by the representatives of the Army Engineers.

Danforth Navy Anchors are of great interest to operators of all seagoing craft, from hydroplanes to ocean liners, because of the possibilities for great holding power at low weight.

A New Number In a Well-known *Marine Diesel Line*

Frank Bramante's trolling boat Anna B., of San Francisco. 38′ x 12′ x 4′ draft, her 35 horsepower Caterpillar Diesel pushes her along at 9 miles per hour.

Caterpillar Tractor Co. has announced the addition of a four-cylinder, 35-horsepower, model D4400 engine to its line of marine diesels.

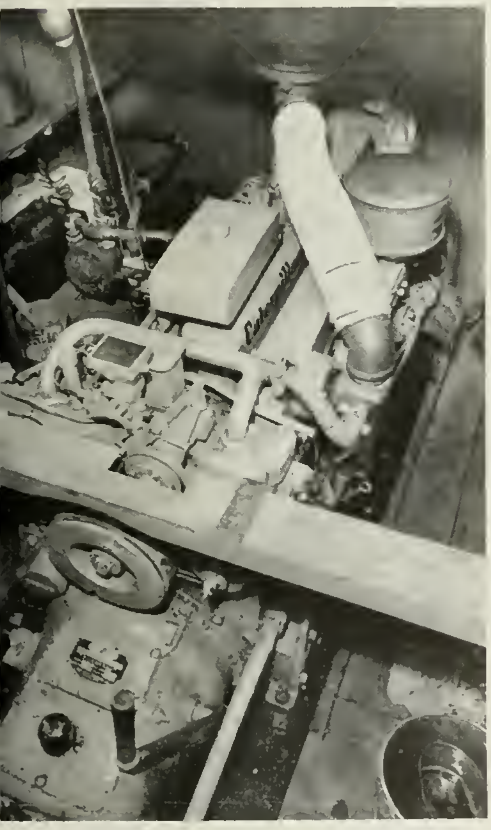
The new engine is medium speed, medium weight, and well suited to the workboat field. Its rating is for service 24 hours a day, 365 days a year, if desired.

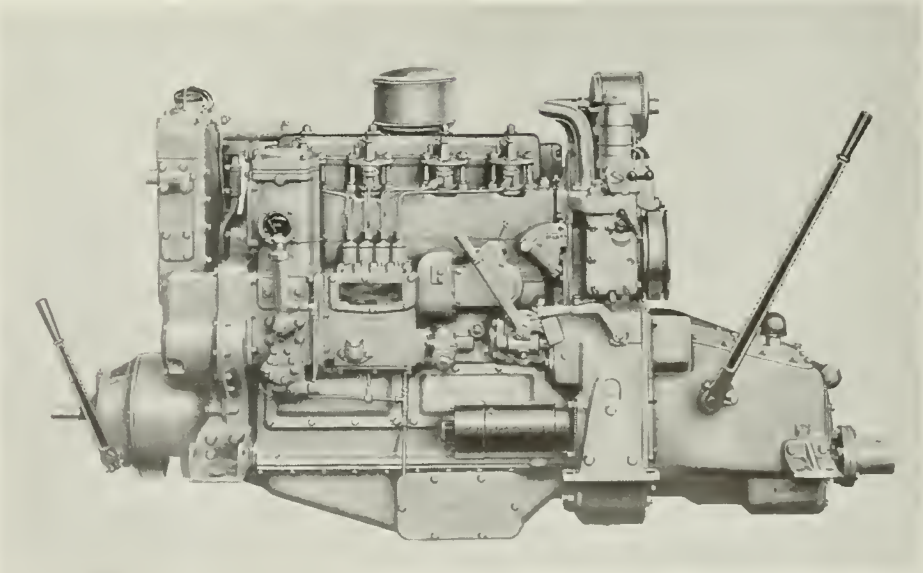
Bore and stroke of the D4400 marine are 4¼″ x 5½″, and the maximum horsepower is produced at 1500 r. p. m. Standard starting equipment consists of a two-cylinder, independent, 10-horsepower gasoline engine, which turns the larger engine through a disk clutch and helical gears to the flywheel. Electrical starting is also available.

Extreme simplicity characterizes the new marine engine. There is only one adjustment to make on the entire unit—that is, the valves.

There are no adjustments to be made on the fuel system. Pumps and injection valves are factory set and require no attention on the job. The valves are spring operated and are of the single orifice type. The large size of the opening assures against clogging and practically eliminates the need for removing spray valves.

Like other "Caterpillar" diesel marine engines, the D4400 is a complete unit. Equipped with Joe's or Twin Disk reverse gear, it is ready for operation when but five connections have been made. It is only necessary to connect the exhaust to atmosphere, sea water suction to raw water line, heat exchanger outlet to overboard discharge, fuel oil line to main storage tank, and to align the thrust bearing shaft and connect it with the propeller shaft.





At right: The new model D4400 marine diesel, rated 35 horsepower at 1500 r.p.m., fitted with twin disk reverse and reducing gear.

Above: A Caterpillar 35 horsepower marine diesel installed in the trolling boat Anna B. The Thomas A. Short Co. are marine distributors for this engine at San Francisco.

On the Ways—

SHIPS IN THE MAKING

LATEST NEWS FROM AMERICAN SHIPYARDS

Pacific Coast Shipyards Begin to get Contracts

Last month we recorded the fact that Consolidated Steel Corporation had been awarded four C-1 type cargo carriers at a price of $1,890,000 each. Now, 30 days later, there are contracts to build 15 more of these ships placed with Pacific Coast yards, and evidently this is just the beginning.

As we go to press, the Moore Dry Dock Company is expecting two more C-3s. So we now have $50,000,000 of merchant shipping building in Pacific Coast yards, where one year back there was no shipbuilding.

The stories of these awards as released by the U. S. Maritime Commission follow:

Bethlehem Gets 10— Five for Union Plant

The United States Maritime Commission announced on September 8 award of contracts for the construction of 10 C-1 type single screw cargo ships, five of which are to be constructed by the Bethlehem Steel Corporation at its Sparrows Point, Maryland, yard at a price of $1,889,000 each; and five at the yards of its subsidiary, Union Iron Works, San Francisco, California, at a price of $2,002,000 each. The latter price includes the six per cent differential applying to West Coast construction under the Merchant Marine Act of 1936.

Minor changes requested by operators are expected to result in a reduction below the contract price, which is based upon the original specifications.

Western Pipe and Steel Awarded Five C-1 Ships

The United States Maritime Commission on September 15 announced award of a contract for construction of five C-1 type single screw cargo ships to Western Pipe and Steel Company, San Francisco, California, at a price of $2,127,000 each. The price includes the six per cent differential applying to West Coast construction under the Merchant Marine Act of 1936, and minor changes have been requested in the original specifications, which are expected to result in a reduction below the contract price.

The ships are to be diesel propelled, of the full scantling type, and will be constructed for the commission's own account.

This award brings to 34 the number of C-1 cargo ships contracted for by the commission since bids were received on July 11, 1939.

The C-1 ships are 416 feet overall, breadth 60 feet, with a displacement of 12,875 tons. Each will have 4000 shaft horsepower, developing a sea speed of 14 knots at loaded draft. They will be equipped with the most modern and efficient cargo handling devices available.

Seattle-Tacoma Shipbuilding Corp. Gets 5 C-1s

The United States Maritime Commission on September 10 announced award of a contract for construction of five C-1 type single screw cargo ships to Seattle-Tacoma Shipbuilding Corporation, Seattle, Washington, at a price of $2,127,000 each. The price includes the six per cent differential applying to West Coast construction under the Merchant Marine Act of 1936, and minor changes have been requested in the original specifications, which are expected to result in a reduction below the contract price.

The ships are to be diesel propelled, of the full scantling type, and will be constructed for the commission's own account.

Seattle-Tacoma Shipbuilding Corporation is a combination of the Todd Puget Sound interests with the General Construction Co., of Seattle, and its affiliates. R. J. Lamont, president of the Todd Seattle Dry Docks, Inc., of Seattle, is also president of this company; J. A. McEachern, of the General Construction Co., being vice president.

This marks the culmination of negotiations with the Maritime Commission to bring a restoration of the shipbuilding industry to the Pacific Northwest. The cooperation of Seattle and Tacoma labor was an important factor in securing the award.

The plan involves the rehabilitation of the Todd Tacoma shipyard for the construction of the hulls, the completion and outfitting of the vessels to be performed at the plant of the Todd Seattle Dry Docks, Inc., in Seattle.

SHIPBUILDERS and ENGINEERS

BUILDING WAYS FOR WOOD AND STEEL CONSTRUCTION

Three Plants

OAKLAND PLANT
Dry Dock and Machine Shop
Dry Dock cap.: 12,500 tons
Length 450 feet
FOOT OF FIFTH AVENUE
Tel.: GLencourt 3922

SAN FRANCISCO OFFICE AND PLANT
Machine Shop
and
General Repairs
1100 SANSOME STREET
Tel.: SUtter 0221

ALAMEDA PLANT
Two Dry Docks
3,000 tons and 5,000 tons
capacity
FOOT OF SCHILLER STREET
Tel.: ALameda 0533

GENERAL ENGINEERING
and DRY DOCK COMPANY

• Eleven Vessel Contracts Awarded

On September 22 the United States Maritime Commission announced award of contracts for the construction of eleven vessels.

Four will be built by the Bethlehem Steel Company at its Quincy, Massachusetts, plant at a price of $2,430,000 each. These ships will be acquired by American Export Lines, operating between United States North Atlantic ports and the Mediterranean and Black Seas. They are 475 feet overall, 14,450 tons displacement, with a speed of 16½ knots.

Three others will be constructed by Bethlehem Steel Company at its Sparrows Point, Maryland, plant at a price of $2,140,000 each. These ships are to be acquired by the Seas Shipping Company, which operates the Robin Line, running from New York to South and East Africa. They are 485 feet overall, 15,200 tons displacement, with a speed of 15½ knots.

Four C-3 cargo ships will be constructed by Ingalls Shipbuilding Corporation, Birmingham, Alabama, at its Pascagoula, Mississippi, plant at a price of $2,550,000 each. These ships are to be constructed for the Maritime Commission's account. They are 492 feet overall, 17,600 tons displacement, with a speed of 16½ knots.

• Bethlehem Staten Island Awarded Five C-1s

The United States Maritime Commission on September 13 announced award of a contract for construction of five C-1 type single screw cargo ships to the Bethlehem Steel Company, New York City, for its Staten Island yard, at a price of $1,909,000 each. Minor changes have been requested in the original specifications, which are expected to result in a reduction below the contract price.

The ships are to be steam propelled, of the full scantling type, and will be constructed for the commission's own account.

• Commission Awards Six C-2s

The United States Maritime Commission on September 23 awarded contracts for the construction of six vessels.

Two C-2 direct drive diesel cargo ships are to be built by the Sun Shipbuilding and Dry Dock Company, Chester, Pa., at $2,257,000 each.

Four C-2 geared turbine drive cargo ships are to be built by the Tampa Shipbuilding and Engineering Company, Tampa, Florida, at $1,950,000 each. During August, 1939, the Tampa firm had been tentatively awarded a contract to build five C-1 type vessels but had not yet started work. In submitting its bid for four C-2s, it informed the commission that it would not be able to undertake work under both these bids on account of limited facilities. The commission consequently has rescinded its action in connection with the earlier award.

• Sun Gets Six C-2 Motorships

On September 20 the United

States Maritime Commission announced the award of contracts for construction of six modified direct drive diesel vessels of its C-2 design to the Sun Shipbuilding and Dry Dock Company, Chester, Pennsylvania, at a price of $2,277,000 each.

These ships are 459 feet overall, 63 feet wide, 13,900 tons displacement, cargo capacity 7,549 tons, and a speed of 15½ knots.

This brings awards to date under the commission's construction program to 114.

● Bids for 20 C-2 Type Vessels

The United States Maritime Commission on September 19 received the following bids for construction of 20 of its C-2 type, single screw cargo ships:

Sun Shipbuilding & Dry Dock Co., Chester, Pa.

Direct drive, diesel propelled:

	Fix. Price	Adj. Price
One	$2,941,780	$2,606,080
Six each	2,731,780	2,506,080

Direct drive, diesel propelled—alternate bid:

One	2,712,000	2,377,000
Six each	2,502,700	2,277,000

Direct drive, diesel propelled—second alternate bid:

One	2,200,000	2,000,000
Two each	2,128,500	1,935,000

The alternate bids by Sun Shipbuilding & Dry Dock Company were for construction of C-2 type vessels with changes in specifications which have been suggested by operators.

Geared drive, diesel propelled:

One	2,310,000	2,100,000
Two each	2,238,500	2,035,000

Federal Shipbuilding & Dry Dock Co., Kearny, N. J.

Steam propelled:

	Fix. Price	Adj. Price
Eight each	$2,414,500	$2,195,000

Tampa Shipbuilding and Engineering Co., Tampa, Fla.

Geared drive, diesel propelled:

	Fix. Price	Adj. Price
Four each	$2,150,000	$1,950,000

The Tampa Shipbuilding and Engineering Company said in a letter accompanying its bid that because of limited yard capacity it will not be able to accept awards for construction of five C-1 type ships (already awarded) and for the four C2s bid on at this time. The company said it would be glad to accept an award for either at the pleasure of the commission.

Ingalls Shipbuilding Corp., Birmingham, Ala.

Geared drive, diesel propelled:

	Fix Price	Adj. Price
Four each	$2,442,000	$2,124,000

The Ingalls Shipbuilding Corp. said in a letter accompanying its bid that because of its limited yard capacity it desired to nullify this bid should its bid with respect to C-3 type vessels, to be opened by the commission at noon, September 20, be accepted. The Ingalls Corp. now has a contract for construction of four C-3 type vessels.

The commission previously had contracted for construction of 20 C-2s, several of which have been completed and entered transatlantic service. Trials have shown them to be among the most efficient and economical vessels of their class in the world. They are 459 feet in length overall, 63 feet wide, 13,900 tons displacement, with cargo capacity of 7,549 tons and a speed of 15½ knots.

Sparrow's Point Launches Esso Annapolis

The second of three high-speed National-Defense Feature tankers to be built for Standard Oil Company of New Jersey at the Sparrows Point Yard, Shipbuilding Division, Bethlehem Steel Company, was launched on September 9 at 12:30 o'clock noon. The new vessel was christened the Esso Annapolis by Miss Margaret B. Howard, daughter of Mr. B. B. Howard, assistant general manager of the Marine Department, Standard Oil Company of New Jersey.

A luncheon in honor of the sponsor, given by Bethlehem Steel Company at the Belvedere Hotel, Baltimore, followed immediately after the launching. Both functions were attended by a number of officials of Standard Oil Company and Bethlehem Steel Company, as well as guests from New York, Baltimore, Annapolis, Washington and elsewhere.

The Esso Annapolis represents the latest improvements in tanker design and construction, including the Bethlehem-Frear system of bulkheading, and extensive use of welding. She will have a total deadweight capacity in excess of 16,300 tons, and a cargo carrying capacity of over six million gallons. The principal characteristics are as follows:

Length overall	553 ft.
Beam (molded)	75 ft.
Depth (molded)	39 ft.
Speed	18 knots

The entire construction, including all living quarters, is fireproof throughout, and all accommodations are designed to conform to the highest standards of comfort.

The navigation equipment is of the most modern type, and every precaution has been taken to insure the safety of the vessel and crew at sea.

The ship is built to the highest class of American Bureau of Shipping, under their special survey, and in accordance with the regulations of the Bureau of Marine Inspection and Navigation. She complies with the highest requirements for carrying petroleum products through the Panama and Suez Canals.

Dependable Insurance Since 1863

Fire · Automobile · Marine · Casualty · Fidelity · Surety

FIREMAN'S FUND GROUP

Fireman's Fund Insurance Company — Occidental Insurance Company
Home Fire & Marine Insurance Company
Fireman's Fund Indemnity Company — Occidental Indemnity Company

New York · Chicago · SAN FRANCISCO · Boston · Atlanta

Strength Permanence Stability

War Risk Rates

European freight rates have been increased from 33 1/3 per cent to 50 per cent, but ship operators do not consider this increase adequate to compensate for the sharp advances in war risk insurance.

The lowest rate quoted to European ports in general was 6 per cent, covering shipments to the United Kingdom, Continent Gibraltar to Holland; to Norway, Bergen and north via the Northern route.

On a vessel which was to call at a United Kingdom port, the premium for war risk insurance on the vessel itself (excluding value of cargo) was about $55,000, covering this single voyage.

In that case it would seem that insurance on the hull and insurance on the cargo each cost one-half of the freight earnings paid for carrying the cargo from this Coast to the destinations of the ships in Europe, exclusive of operation, stevedoring, crew wages, fuel, port dues and Canal tolls.

Following is a list of some of the war risk insurance rates, excluding shipments by German, Italian and Chinese vessels:

To United Kingdom, Continent Gibraltar to Holland, Norway, Bergen and north via Northern route, American vessels nothing, foreign vessels 6 per cent; to Denmark and Sweden not beyond Malmo and Norway south of Bergen, American 6½ per cent, foreign 8½ per cent; to Mediterranean excluding Black Sea, Sea of Marmora, Italy and possessions, American 6 per cent, foreign 7½ per cent; to Black Sea and Sea of Marmora, American and foreign 8½ per cent; to Palestine ports, American 6.05 per cent, foreign 7.55 per cent, and to interior points, American 6.17 per cent, foreign 7.67 per cent.

North American excluding Canada to and from South America south of Paramaribo and Buenaventura, American and Latin American vessels ¼ per cent, other neutrals except Italian vessels ½ per cent, British, French, Polish vessels 3 per cent; Canada to and from ports in Western Hemisphere, American and Latin American ½ per cent, neutrals except Italian 1½ per cent, British, French, Polish, 3 per cent.

Nine thousand men have graduated from the Sperry Gyro School, shown at left, during the 25 years of its service to the marine industry. President R. E. Gilmore and Vice-President Robert B. Lee are shown above presenting Certificate No. 9000 to Captain Henry H. Teske (center).

MARINE DEPARTMENT
AETNA INSURANCE CO.
QUEEN INSURANCE CO.
MARITIME INSURANCE CO., LTD.
FIDELITY PHENIX FIRE INS. CO.
Commercial Hull Dept.
AUTOMOBILE INS. CO.

MATHEWS & LIVINGSTON
Marine Underwriters
200 BUSH ST. SAN FRANCISCO
Offices at: Colman Bldg. - Seattle 111 West 7th St. - Los Angeles

Deliver the Cargo

(Continued from page 37)

turn for payment of the freight rate, to those services performed aboard his ship, wherever competitive conditions enable him to do so. May I digress to say that unrestrained, and often foolhardy, competion between carriers has caused many departures from sound steamshipping practice, and the strangest of these are to be found in trades where the controlling competition is with railroads.

I have failed to discover any basic reason why foreign-offshore carriers failed to hold fast to the ship's tackle rate-making principle at all American ports. It was a fixed principle everywhere throughout the lighterage era, and still is where lighterage has continued. It is a fixed principle today in most modern foreign ports around the world.

Perhaps when steamers, cargoes and terminals increased in size, and the number of shipments per vessel grew proportionately, making it a physical impossibility for each consignee to be at ship's tackle there to take delivery of his merchandise, package by package as fast as discharged, shipowners became confused about their obligations and rights. At any rate, it is certain that some time after deep-water terminals replaced lighters along the Pacific Coast, carriers in many trades drifted into the practice of absorbing the cost of handling goods from tackle to pile on terminal, though they made no corresponding change in their ship's tackle bill-of-lading provisions. All that was required to reestablish the ship's tackle principle, in foreign offshore trades, was a series of suitable bill-of-lading and freight tariff clauses by which the carrier, as a practical matter, reserved the right to perform the further service of removing goods from ship's tackle to pile on terminal, and the right to assess and collect for that on shore service a charge in addition to vessel's transportation rate. As you will recall, that was accomplished about three and a half years ago. Whether the carriers exceeded their lawful rights in thus breaking their total charges into two sums, one for transportation, one for service on the terminal, is yet to be determined by the Commission in proceedings now pending.

Let me say in closing that the carrier's obligation to make a delivery or proper tender of delivery has never been disputed by the carriers in any proceeding in which I have participated.

Abstract of paper read before the Pacific Coast Association of Port Authorities, August 24, 1939.

Preservation by Charring

(Continued from page 48)

bonded, non-porous, flat black coating of carbon impervious to moisture and fungi, which will not crack, check or peel under any kind of climatic conditions. Two coats produce a gloss, and one coat of oil paint (except in the very light colors) over Kar-Bon-Seal is actually brighter than three coats of paint on nude wood, because the charring coat prevents absorption and encourages oxidation.

Because the product is made of such finely ground carbon, the seal it forms consists of millions of individual sealed particles each retaining its own character. This is demonstrated by applying it to a piece of rubber inner tube. When it has dried the rubber can be stretched repeatedly and the particles will resume their original position without checking or cracking. On nude wood the product acts as both primer and preserver. A third to a half less paint is required over the product, and any color can be used.

The company also makes another product, Kar-Bon-Sealuminum, which has all properties of Kar-Bon-Seal, but dries to a silvery finish, and also serves as a heat deflector for roof work.

Insuring Cooperation Between Bridge and Engines

Shipowners and ship operators are interested in any device which insures cooperation between the navigating bridge and the engine room.

To be successful, such a device: must furnish dependable signals as to speed and direction of engines that would be unmistakably visible from any point on the bridge; must automatically, instantly and effectively warn the engineer on watch of any error in his response to signals; and must be simple in design and operation, unaffected by weather or temperature, and fool proof.

The Plant Mills Direction Indicator and Engineer's Alarm fulfills all of these conditions. It consists of an indicator on the bridge and an alarm in the engine room. The indicator unit comprises a bronze case with six lenses. The three upper lenses are white; the three lower are red. The lamp back of the upper row shows one white flash for each ahead revolution of the engine. The lamp back of the lower row shows one red flash for each astern revolution. Thus the navigation officer knows immediately if the engineer has made any error in responding to his telegraph instructions.

The engineer's alarm is a large gong surmounted by two red lamps. If any error is made by the engineer in executing an order signaled from the bridge, the two lights flash and the gong rings until the mistake has been corrected.

Williams Dimond & Co., San Francisco, are general agents; and the Toumey Electric & Engineering Co. are marine distributors and installers for Central California. This device is now operating satisfactorily on hundreds of vessels in the American Merchant Marine.

The Port of San Francisco

Tirey L. Ford
President

Frazer A. Bailey
First Vice-President

Charles L. Wheeler
Second Vice-President

Joseph R. Sheehan
Third Vice-President

Eugene Hoffman
Secretary-Treasurer

BOARD OF GOVERNORS

Frazer A. Bailey
Capt. Henry Blackstone
John E. Cushing
Kenneth K. Dawson
Fred L. Doelker
Tirey L. Ford
Hugh Gallagher
A. S. Gunn
Edward H. Harms
George Jordan
Roger D. Lapham
Ira S. Lillick
Joseph A. Moore
Joseph R. Sheehan
Charles L. Wheeler

Plans for Programs

It has now been definitely decided to hold regular luncheon programs of the organization once a month and the new series will be inaugurated in the very early future . . . propably around the middle of October. Details of time and place are now being formulated and official notices will soon reach the entire membership.

Plans are under way for an exceptionally interesting meeting for the first event and it is anticipated that a full attendance will be on hand for the occasion.

● Ed Harms Thanked

Edward H. Harms, who did such a magnificent job as Chairman of the temporary Committee on Organization, was cordially thanked by the Governors for his splendid work in getting the Club started . . . and particularly for handling the many details in connection with the chartering luncheon which was held two months ago. Mr. Harms' temporary committee now turns over their responsibilities to the newly created committees established under the by-laws.

● Committees Named

The Board of Governors of the Propeller Club of the United States, Port of San Francisco, held a luncheon meeting at the Commercial Club Monday, September 25th, 1939.

In attendance were President Tirey L. Ford, who presided, First Vice President Frazer Bailey, Second Vice-President Charles Wheeler, Captain Henry Blackstone, Messrs. Hugh Gallagher, Alfred S. Gunn, Edward H. Harms, George Jordan, and Secretary-Treasurer Gene Hoffman.

Committee chairmen, vice chairmen, and various committee members were duly nominated and elected as follows:

Ways & Means Committee:
- John T. Creany, Chairman
- Arthur B. Poole, Vice Chairman
- Starr Bruce

House Committee:
- Bernard N. De Rochie, Chairman
- Edward H. Harms, Vice Chairman
- Captain Lewis Mesherry
- Byron O. Pickard

Committee on Membership:
- Joseph A. Moore, Jr., Chairman
- Hugh Gallagher, Vice Chairman
- Captain Henry Blackstone
- Edward H. Harms

Committee on Admissions:
- Same personnel as Committee on Membership

These are the four standard committees prescribed by the by-laws of the Propeller Club of the United States, and each chairman is authorized to add members to his respective committee up to a total of five.

In addition to the above, a special committee, to be known as the **Committee on Education**, was appointed as follows:

EDWARD H. HARMS

Captain Henry Blackstone, chairman.

Richard A. McLaren, Vice Chairman.

Ira S. Lillick, Vice Chairman.

The functions of the Committee on Education have been defined as follows: (a) To maintain contact with the California State Nautical School Ship, the University of California, Stanford, and such other universities of higher learning as may be interested in forming student Propeller Clubs; (b) to contact primary and high schools in the interest of furthering the "Adopt a Ship" program, and (c) to pursue in the discretion of the Committee any other course designed to encourage greater patronage of the American Merchant Marine.

President Ford and Vice President Wheeler volunteered as a special committee of two to investigate the methods of approach and procedure in handling the "adopt a ship" project with local grade and high schools. Their findings will be made available to the Committee on Education.

● San Francisco at the A.M.M. Conference

The National Convention of the Propeller Club in New York during the period from October 8-11 will be attended by several of the executive officers and the members of the Port of San Francisco. An officially accredited delegate will be Byron C. Pickard who will address the Convention on the subject of Safety in the American Merchant Marine. Others who expect to attend include President Ford, Vice President Joseph R. Sheehan and Mr. Roger D. Lapham.

On the Pacific Range

DURKIN INJURED

Owen E. Durkin, manager of the Marine Exchange of the Los Angeles Chamber of Commerce, was seriously injured on September 21 in an automobile accident. . . . He was taken to the Queen of the Angels Hospital in Los Angeles.

IN NEW YORK

J. D. Baker, general freight agent at Los Angeles for the Panama Pacific Line and Coastwise Line, arrived in New York on the recent voyage of the Panama Pacific Line's intercoastal steamer City of Newport News. . . Baker is making a combined business and pleasure trip throughout the East. . . He is accompanied by Mrs. Baker.

BATTLESHIP UNIT TWO

Rear Admiral Walter N. Vernou broke out his flag as new commander of Battleship Division Two in a ceremony aboard the flagship Tennessee at San Pedro on September 30. . . Admiral Vernou succeeds Rear Admiral Adolphus E. Watson, who goes to Washington to serve as a member of the Navy general board.

PILOTAGE BOARD

Captain Joseph Reardon, Captain L. B. Lovejoy and **Watson Barr** were recently appointed to the Washington State Board of Pilotage Commissioners by Governor Clarence D. Martin. . . H. W. Burchard, president and general manager of Furness Withy Company and president and treasurer of Burchard & Fisken, Inc., was reappointed to the board. . . Barr is Northwest manager of the Dyson Shipping Company, representative of the Pacific Coast Direct Line and the Weyerhaeuser Line and Seattle manager of the Inter-ocean Steamship Corporation.

Captain Reardon, president of the Puget Sound Pilots Association, and Captain Lovejoy are veteran Puget Sound pilots, fulfilling the provision of the statute requiring that two members of the board must be active pilots. . . Ex-officio chairman of the board is J. Webster Hoover, director of labor and industries. . . The term of the new members expires in 1943. Retiring board members are E. C. Bentzen, president of the Consolidated Olympic Line, and Captain T. H. Lea and Captain Thomas Quinn.

B. A. McLEAN TO S. F.

Frank Evers, principal surveyor on the Pacific Coast for the American Bureau of Shipping, announces that **B. A. McLean** is now connected with the staff of surveyors in the San Francisco Bay district. . . McLean has been in the East for twelve years, and coming back to San Francisco brings him again to his home town.

COMMANDER THOMPSON

Commander W. K. Thompson, 53 years old, head of the newly combined Coast Guard and Lighthouse Service in Alaska, passed away at Ketchikan, on September 1. . . Commander Thompson served in the Coast Guard for thirty-one years. Two years ago, as commander of the cutter Itaska in the Mid-Pacific, he was the last known person to hear from Amelia Earhardt on her ill-fated Pacific hop. He was assigned to the Alaska service in July after recent service as commander of the cutter Ingham, stationed at Port Angeles.

FRANK W. FULLER, JR.

Frank W. Fuller, Jr., San Francisco sportsman pilot and executive of W. P. Fuller & Co., was recently elected to the remaining vacancy on United Air Lines' Board of Directors. . . The appointment was announced by President W. A. Patterson of U. A. L.

APL APPOINTMENT

Joseph R. Sheehan, president of the American President Lines, announced the appointment of A. A. Alexander as general agent for the Eastern territory with headquarters in New York.

C. C. MALLORY VISITS COAST

C. C. Mallory, vice-president of the Grace Line in New York, visited Grace offices on the Pacific Coast. . . In San Francisco he conferred with Edward T. Ford, Fred Doelker and W. R. Phillips. . . Mallory served many years with the Grace organization in San Francisco before going to New York headquarters. . . H. R. Kelly, another of the W. R. Grace & Co. executives at San Francisco, is now on a trip to South American ports.

ARBOGAST HONORED

Glenn Arbogast, president of the Los Angeles Board of Harbor Commissioners, was elected president of the Pacific Coast Association of Port Authorities at the 26th annual convention held in Oakland. . . . Others chosen for office included K. J. Burns of Vancouver, B.C., vice-president; Irwin M. Stephens, president of the Long Beach Harbor Board, second vice-president; and Don Marshall, general manager of Long Beach Harbor, secretary-treasurer. . . . Long Beach was selected for the 1940 convention.

AMONG OUR VISITORS

Recent visitors to San Francisco and bay points were **Captain Curt Zastrow,** commander of the Grace Line flagship Santa Rosa. . . With him was Mrs. Zastrow, and they went to their former home in Marin county. . . Captain Zastrow specially enjoyed a visit with **Fred Doelker,** Pacific Coast manager of the Grace Line, and **W. R. Phillips,** manager of the W. R. Grace coffee department. . . Captain Zastrow began his career as a cadet in the historic Pacific Mail S. S. Company.

GEORGE ATKINS PASSES

George H. Atkins, 68, pioneer Bay resident and member of the shipping and trading firm of Atkins, Kroll & Co., passed away early last month in Berkeley. . . He was one of the best known of the older generation of shipping leaders, particularly in the sailing ship days in the South Seas and Antipodes trade.

EGBERT HOME FROM NORTH

Edward Egbert of the firm of Hough & Egbert, Inc., has returned to San Francisco following a trip to Seattle. . . . Ed had occasion to visit with a number of old friends; among them was Jack Gilmore, who is associated with James Gow in the survey business. . . . The Gow firm was busy with the Dutch freighter Djambi, which went ashore at Point Wilson. . . . Repairs to this vessel, done at Todd Seattle Drydock, made one of the most important jobs in the Northwest in many years. . . . The price was $133,509 and 21 working days.

DON BURROWES IN EAST

American President Lines' general office manager and personnel director—**Don Burrowes** is on a three weeks business trip to the company's New York and Eastern offices.

ZAMBOANGA PILOT

Captain George Littman visited San Francisco, on vacation from his home in Zamboanga. . . He first came to the Golden Gate 60 years ago, a cabin boy in the sailing ship Neptune. . . Captain Littman is still connected with the Zamboanga Pilots Association and is a member of the firm of Baisland Lumber Company in the Philippines.

N. Y. K. AT NEW YORK

Edward G. White, passenger manager for the N. Y. K., advises that E. A. Kinsey, new district passenger manager in New York has reached his post from Hongkong. . . Kinsey is well known in San Francisco and Los Angeles, where he was with the old Los Angeles Steamship Company. . . He served seven years in Hongkong.

THOMAS E. CUFFE RETURNS

Thomas E. Cuffe, assistant vice-president and freight traffic manager of the American President Lines, has returned to the head office in San Francisco after a six months assignment in New York. . . . When interviewed by a PMR newsman Tom declared "I am delighted to get back home!"

HOLLAND-AMERICA LINE

H. D. Laferte of Holland-America Line's San Francisco office returned to his office recently after an extended business trip to Holland.

EAST ASIATIC LINE

Knud Munck-Larsen, vice-president of the East Asiatic Line, is home again in San Francisco after a three months pleasure trip to Copenhagen.

WINDQUIST ON WAR OUTLOOK

Ray Windquist, general traffic manager of General Steamship Corporation, spoke before the Junior Foreign Trade Association in San Francisco, his timely topic "War Effects on Pacific Coast Shipping."

IVOR J. JAMES, GPA

William Semar, vice-president and general manager of the Northland Transportation Company of Seattle, announces the appointment of **Ivor J. James** as general passenger agent. . . . James was with the old Pacific Steamship Company from 1919 until it suspended operations, then joined the Northland Transportation staff.

REGULATIONS HEAD

L. C. Nelson, director of the Division of Regulations of the U. S. Maritime Commission, recently visited Pacific Coast ports conferring with steamship officials and the heads of a number of operating lines. . . Nelson's work is to approve conference agreements and tariffs. . . He has now returned to USMC headquarters in Washington, D. C.

CAPT. LEB CURTIS

The appointment of Capt. Leb Curtis, veteran Pacific shipmaster and salvage expert, to the post of operating manager of the new Port of Hueneme came concurrently with the harbor's first heavy weather test on September 26. Capt. Curtis said that although the harbor's west jetty and entrance channel were still incomplete, it came through the storm unscathed, offering refuge to many small craft cruising in the vicinity.

For many years a master in sail and steam, Capt. Curtis is well fitted by practical experience for the important position he has just assumed. He was vice president of Merritt, Chapman & Scott, in charge of the company's Pacific operations, until they retired from West Coast activities in 1937. Prior to his connection with that firm, he was a member of Pillsbury & Curtis, marine surveyors and consultants, in San Francisco. Before going to Hueneme, he was in the general maritime contractors business at San Pedro.

SPEECH ON THE ORIENT

"The Orient Today" will be the subject of Richard S. Turner, Export Manager of the Associated Oil Company, speaking before the Oakland Foreign Trade and Harbor Club at the Hotel Coit on Thursday evening, October 5.

Mr. Turner, a former president of the Foreign Trade Association of San Francisco, is an interesting and forceful speaker. He has just returned from a business trip to the Far East, where he spent the past year and a half in the interests of foreign trade. He traveled extensively throughout the Orient, and although considerable time was spent in the Philippines and Australia, most of his attention was devoted to the Japanese and Chinese areas.

NORDSTJERNAN LUNCHEON

An informal luncheon recently served aboard the luxury motorship Nordstjernan at pier 37 signalized the 25th anniversary of Johnson Line's Pacific Coast-European service.

Captain C. O. Holmberg, veteran master in point of service, was host. Fred L. Doelker, Pacific Coast manager for W. R. Grace & Co., agents for the Swedish line ever since they started service, was toastmaster. Captain Karl Andreason, owner's representative, expressed the appreciation of Consul General Axel Johnson, president, to the shippers of California and the rest of the Pacific Coast for their generous support.

An unexpected guest was Captain J. A. Andersson, just in with his command, the Annie Johnson.

The Propeller Club of the United States Port of Los

More than a hundred shipping executives were present at the Charter Members luncheon meeting of the Propeller Club, Port of Los Angeles held at the Jonathan Club on September 1st, when the Charter was formally presented to this organization by The Propeller Club of the United States.

The meeting was presided over by Ralph J. Chandler, president of the Propeller Club, Port of Los Angeles and vice-president of the Matson Navigation Company. Expressing his gratification at the genuine interest which has been manifested by the marine fraternity of Los Angeles in the new club, Mr. Chandler touched briefly on some of the serious problems confronting American shipping on the west coast and which the Propeller Club, Port of Los Angeles, will attempt to solve in conjunction with the Propeller Clubs located at San Francisco, Portland, Seattle, Tacoma and Bellingham.

Arthur M. Tode, Honorary President of The Propeller Club of the United States, was the chief speaker. He had only returned that morning from Hawaii after organizing and chartering the Propeller Club, Port of Honolulu (Port No. 67). Mr. Tode thereafter introduced Mr. Joseph R. Sheehan, vice-president of the Propeller Club, Port of San Francisco and president of the American President Lines, Ltd., who had been requested by National Headquarters of the Propeller Club of the United States to officially present the charter to the Propeller Club, Port of Los Angeles.

Address by Jos. R. Sheehan

Pacific Marine Review takes pleasure in presenting excerpts of Mr. Sheehan's speech, as follows:

"We have all heard it said that blood will tell, and I am sure that this port of Los Angeles of the Propeller Club of the U. S., today being born, will prove to be as lusty an infant as is every club or organization that is conceived of Los Angeles stock and nurtured in the Los Angeles atmosphere. It will have sixty-five older brothers, but they will, I am sure, never become unaware of this youngster's existence.

"I am particularly interested in the Propeller Club of the United States because its objectives are practically identical with those which I have been pursuing ever since I became identified with American shipping. There is need for organized effort in the task of selling the American Merchant Marine to our citizens, and this is the organization around which the industry can rally and give force to a unified drive to advance the cause of American Merchant shipping. Anything designed to promote the welfare of the American Merchant Marine is naturally very near my heart.

"The objectives of the Propeller Club constitute a decent, honest and patriotic ideal toward the accomplishment of which every American should strive and for which ideal he should never feel apologetic. Under the circumstances which exist this very day, many of us may feel that we are in the position of Cassandra, the woman of Greek mythology, to whom was given the faculty of always being able to predict the future with complete accuracy, but who at the same time was laboring under a curse whereby nobody ever believed her.

"For almost 9 months I have been preaching the gospel of the American Merchant Marine and have advocated its development on the ground that we must be ready for emergencies in order to protect our commercial interests and to help in national defense. God knows I do not welcome the opportunity of being able to say to some critics of my ideas—'I told you so,' but the fact remains that we are now undoubtedly faced with such an emergency, and our Merchant Marine, although in infinitely better shape than it was in 1914, may be called upon to undertake a job which eventually may prove to be far beyond its ability to perform. For the last week we have been reading in the newspapers of frantic efforts of American citizens to get passage on American ships in order that they might get home, and the ironic feature of this situation is that thousands of them who have been clamoring for space on American vessels, had previously booked passage on foreign ships. Many people, who, a few months ago, scorned American ships because they were supposed to be inferior to foreign flag ships, have recently found plain cots perfectly satisfactory, as long as those cots were on vessels flying the American flag. Even a freighter, converted to passenger status in forty-eight hours, the President Monroe of the American President Lines, was regarded as a luxury liner by those who saw the American flag at her masthead.

Charters

Angeles

OFFICERS AND BOARD OF GOVERNORS

At Presentation of Charter by the Propeller Club of the United States to the Propeller Club, Port of Los Angeles (Port No. 66)

Jonathan Club, Los Angeles, Sept. 1st, 1939

Front row (left to right): Morgan Huntoon, 3rd Vice-President, Propeller Club, Port of Los Angeles; Fred A. Hooper, 1st Vice-President, Propeller Club, Port of Los Angeles; Arthur M. Tode, Honorary President, The Propeller Club of the United States; Ralph J. Chandler, President, Propeller Club, Port of Los Angeles; Joseph R. Sheehan, Vice-President, Propeller Club, Port of San Francisco; Edgar M. Wilson, 2nd Vice-President, Propeller Club, Port of Los Angeles.

Rear Row (left to right): (Board of Governors) Lloyd Richards, J. L. Adams, Frederic Pique, D. N. Lillivand, Eugene Mills, Thomas Forster, J. L. Hook, Jr., Capt. C. S. McDowell, U.S.N., Retired, David Livingston, Secretary.

Missing: (Board of Governors) J. D. Baker, J. B Banning, Jr., Capt. H. H. Birkholm, Capt. C. N. Mayo, Harold C. Smith, Capt. C. C. Spicer.

"I have urged every American to constitute himself as a salesman for the American Merchant Marine. I urge you today to undertake that role, although I know full well that if we are to have a prolonged war in Europe, we shall need no salesmen for the American Merchant Marine, at least during the period of that war, as many of the Americans who in years past have not seen fit to patronize our vessels, will now be clamoring for their help in moving goods.

"It may be significant that the port of Los Angeles of the Propeller Club of the United States, is being born only twenty-four hours after the launching of the largest vessel ever built in the United States, and this launching is to me the only cheerful note in the day's news. At that launching Mrs. Roosevelt, the sponsor of the America, read a letter from the President to Admiral Land, chairman of the Maritime Commission, in which the President set forth in comparatively few words, the reasons why our Merchant Marine must be developed and maintained. The President said the tense state of the international situation makes it particularly desirable that we have a merchant fleet capable of carrying our commerce if and when foreign ships are withdrawn and, should the unfortunate necessity arise, of serving as the necessary supply force for naval vessels. You and I know from our work during the war, the disabilities of a navy which lacks an adequate merchant fleet. With all its enormous potential combat power, such a navy is tied to its land bases.

"The construction of this vessel is one of the real major steps in the program of the U. S. Maritime Commission to rehabilitate our Merchant Marine, and I cannot help feeling that by the spontaneity which was displayed in the creation of the port of Los Angeles of the Propeller Club, that you gentlemen have indicated in a most forceful manner your desire to co-operate actively in the fulfillment of the Commission's program.

"In conclusion I want to pay brief tribute to Mr. Arthur Tode, National Honorary President of the Propeller Club of the United States, who has given so generously of his time, effort and money in propagating the Propeller Club. To his initiative and energy alone is due the fact that there are as many ports as there are. The shipping industry is greatly indebted to Mr. Tode, and we know that his only return is the knowledge that he has done a patriotic duty.

"President Chandler, my compliments and sincere congratulations. I trust that the Propeller Club of the United States, Port of Los Angeles, will have an illustrious future, and it is my honor now to present to you the Charter of the Propeller Club of the United States, Port of Los Angeles."

Propeller Club of California

News of the Month

The "old guard" of California Propellers is being mustered for the club's observance of Harbor Day . . . collaborating with The Marine Exchange, The State Board of Harbor Commissioners, The Foreign Trade Association and San Francisco's Junior Chamber of Commerce.

The big day is Thursday, September 28th and the location is the large waiting-room on the second floor of the Ferry Building. Speaker for the occasion is Jack Densham, beloved newspaper scribe. Ernie Smith, of sports-casting fame, will handle the microphone and a 30-minute program will go out over the Mutual System.

The committee for the sponsoring groups consists of

Wm. C. Empey
John J. Judge
Leo F. Kaufman
F. C. Kugelburg
Chas. Lulback, Jr.
Edw. J. Macfarlan
Jos. F. Marias
Carl Moore
Edw. D. Peralta
James A. Wagstaff

• Resolution of Thanks

Following the August 24th event "A Night in San Francisco" at which The Propeller Club of California joined hands with The Marine Exchange and The Foreign Trade Association in entertaining delegates to the Oakland Convention of the Pacific Coast Association of Port Authorities, the following resolution was passed . . . and transmitted to the Club's offices:

"Be it resolved that the State Harbor Board of the Port of San Francisco, The Marine Exchange, The Propeller Club of California, the Foreign Trade Club, hosts to this organization on the evening of August 24th, be extended our sincere thanks and appreciation for a most entertaining and delightful evening enjoyed by the delegates in attendance."

• Commissioner's Talk Remembered

A most pleasant remembrance of the recent program staged by the club honoring **Joseph F. Marias**, president of the Board of State Harbor Commissioners, comes to mind in the receipt of a letter from Mr. Marias extending his thanks for this expression of cooperation to the Harbor Board.

"This spirit was highly reflected," writes Mr. Marias, "and I can only repeat here the pledge I made at the meeting . . . that we of the Port shall do our utmost to be worthy of your continued support."

• Navy Day Plans

Walter J. Walsh has already assembled on several occasions the Navy Day Committee, of which he is chairman and plans for the annual observance are nicely under way.

The latest meeting of the Committee was held on September 20th. Present were:

Walter J. Walsh, Chairman
Capt. Lewis Mesherry, U.S.A., Retired.
Comdr. Frank Harris, U.S.N.R
Comdr. Wm. C. Tooze, U.S.N.R.
Comdr. L. M. Edelman, U.S.N.R.
Comdr. Julian Ducray, U.S.N.R.
Mr. A. Theis
Mr. Ben Foster
Capt. Cyril Meek
Capt. A. T. Hunter
Lt. Wm. Ross Wright, U.S.N.R.
Comdr. C. A. Goebel, U.S.N.
Comdr. Frank L. Worden, U.S.N.
Lt. Comdr. Sidney J. Fass, U.S.N.R.
Mr. J. F. McConkey
Ensign David H. Rosenbaum, U.S.N.R.

The Committee appointments as they stand now are as follows:

Capt. Ross Culp, U.S.N., Chairman of Navy participation.

Comdr. Frank Harris, Chairman of Speakers Committee.

Lt. Comdr. Sidney J. Fass, Radio Committee.

Wm. J. Slamon, Fleet Reserve Assn. participation.

Glen E. Reed, White Squadron Post, Veterans of Foreign Wars.

Capt. Mesherry, Chairman of Ball Committee.

Comdr. L. M. Edelman, U.S.N.R., Sea Scout and Boat Races, and Oakland participation.

Lt. Comdr. Sidney J. Fass, U.S.N.R., Window Decorations, Hotels, and Advertising Committee.

Capt. Meek, assisted by Mr. Foster, Mr. Theis, and Mr. McConkey, Yacht Races and Bird Boat Races.

Capt. Stanley Allen, Merchant Marine Committee, assisted by Capt. A. T. Hunter, vice chairman, Merchant Marine Committee.

Further committees will be appointed, as needed.

Capt. Meek announced that the Sperry Gyroscope Co., through the courtesy of Mr. McConkey, would contribute a cup for the Bird Boat Races.

Comdr. Julian Ducray was placed in charge of municipal contacts, assisted by Lt. Wm. Ross Wright. A detail of seeing that the street cars of the Municipal Railway carry flags on Navy Day and appropriate announcements on the cars was undertaken by Comdr. Ducray.

The meeting adjourned to assemble again on September 27.

• Club's Sponsorship of C. N. S. Exercises Wins Praise

The following letter received during the club's vacationing period recalls the inspiring program arranged for the graduation of California Nautical School cadets.

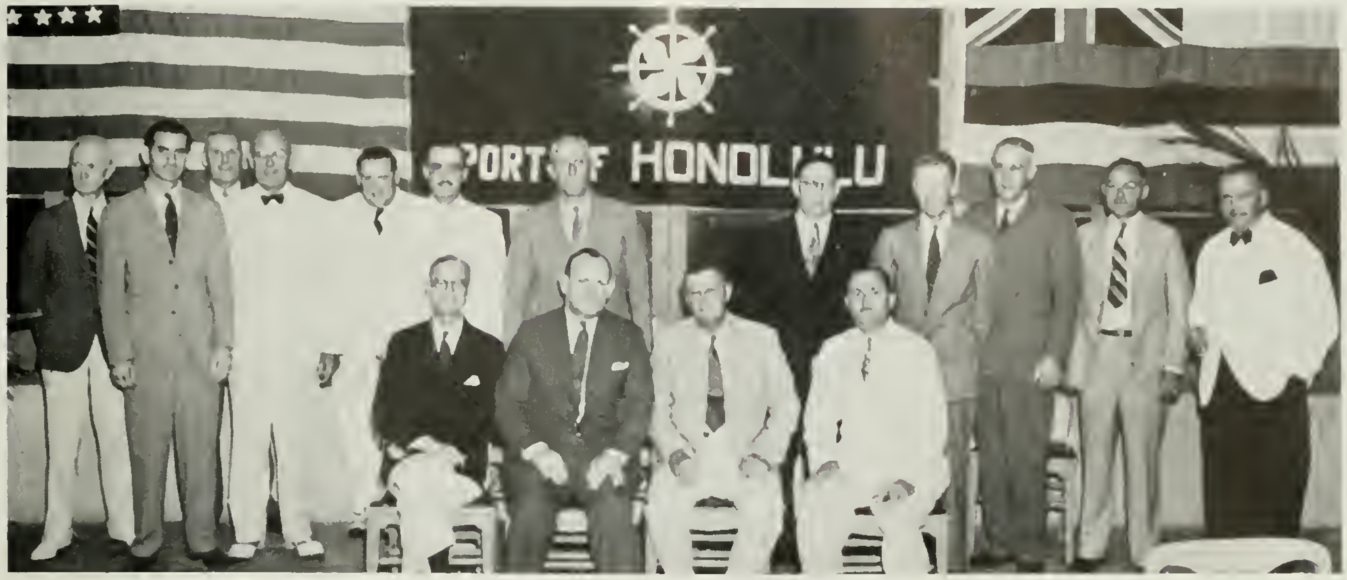
"On behalf of the Board of Governors, officers and Cadets of the California Nautical School, please accept our sincere appreciation and thanks for the cooperation and assistance rendered by you, on the occasion of the recent graduation exercises for the class of 1939, held in the California Building, on Treasure Island, under the sponsorship of the Propeller Club of California, and co-sponsored by many California civic organizations.

"You will be interested to know that many fine comments have been received regarding the fine manner in which these exercises were conducted, all of which indicates that the assistance rendered by you and the Propeller Club aided in making this year's graduation a success.

"Likewise, your help in raising funds for use in projects beneficial to the California Nautical School is deeply appreciated, as is your interest in the School and your assistance in this connection.

Sincerely yours,
Robert H. Fouke,
Chairman of the Board."

The Port of Honolulu is Chartered!



OFFICERS AND BOARD OF GOVERNORS

Front Row (reading left to right): Henry W. Deas, Second Vice-President, Norton, Lilly & Company; Randolph Sevier, First Vice-President, Castle & Cooke, Ltd.; James L. Friel, President, Harbor Master; Arthur M. Tode, Honorary President, The Propeller Club of the United States.

Rear Row (reading left to right): Admiral Orin G. Murfin, U. S. N., Commanding Hawaiian Department; Jay J. Murphy, American President Lines, Ltd.; Comdr. Gordon T. Finlay, U. S. Coast Guard; John A. Young, Young Brothers; Earl M. Thacker, Thacker Transportation Co., Ltd.; Frank E. Thompson, Jr., Secretary-Treasurer, Hawaiian Sales Factors, Ltd.; Lester Petrie, Oahu Railway & Land Company; W. A. Ramsay, W. A. Ramsay, Ltd.; C. G. Harrington, Standard Dredging Company; Frank C. Palmer, Hawaiian Pineapple Company, Ltd.; G. C. Ballentyne, The Hawaiian Freight Assn., Ltd.; Major Parker Tenney, U.S.A., U. S. Army.

Elected Honorary Members of the Propeller Club, Port of Honolulu at Charter Members meeting held on Aug. 23rd were: Honorable Joseph B. Poindexter, Governor, Territory of Hawaii; Honorable Samuel Wilder King, Delegate to Congress from Hawaii; Honorable Charles S. Crane, Mayor, City of Honolulu; Rear Admiral Orin G. Murfin, U.S.N., Commandant, 14th Naval District; Major General Charles D. Herron, U.S.A., Commanding Hawaiian Department.

Charter
Presentation
Dinner,
August 23,
at the
Waialae
Golf Club

Honorary
President
Arthur M. Tode
Addresses
Meeting

THE PROPELLER CLUB OF THE UNITED STATES
PORT OF HONOLULU

Wm. A. Ross to Presidency

William A. Ross was elected president of Columbia Steel Company, subsidiary of United States Steel Corporation, at a meeting of the Company's Board of Directors held recently. Ross succeeds **Ambrose N. Diehl,** who resigned because of ill health and who has headed the Steel Company since 1932.

The new president of Columbia Steel has been connected with the steel industry since 1895, when he went to work for the old Washburn Moen Manufacturing Company as an office boy. In 1899 Washburn Moen was acquired by American Steel and Wire Company and Ross served the new firm as bill clerk and cashier. In 1911 the West Coast holdings of American Steel and Wire Company became the Pacific Coast department of United States Steel Products Company, subsidiary of United States Steel Corporation. Upon this new consolidation Ross was appointed assistant treasurer and then assistant to the vice-president of the Products Company.

In 1930 Columbia Steel Corporation was acquired by United States Steel Corporation. The Pacific Coast department of United States Steel Products Company was then consolidated with the new enterprise under the name of Columbia Steel Company with Ross serving as vice-president and treasurer.

By 1932 he was appointed vice-president and general manager of sales, in which capacity he served until his election to the presidency.

With his resignation, Ambrose N. Diehl, retiring president of Columbia Steel Company, closes an active career of 40 years service to the steel industry.

In 1930 he was made vice-president of United States Steel Corporation and in 1932 was sent to San Francisco to head the new Columbia Steel Company as president.

WILLIAM A. ROSS

Coast Port Authorities

The Twenty-Sixth Annual Convention of the Pacific Coast Association of Port Authorities was held in Oakland from August 23 to 26, inclusive, and a fine spirit of co-operation prevailed throughout all of the sessions which brought about a renewed understanding of the various problems confronting the ports and should do much to assist in their efficient operation during the coming year.

The entertainment program, too, was of high calibre and included a dinner dance and floor show on the opening night, a "Night in San Francisco" as guests of the San Francisco Marine Exchange, Propeller Club and the Foreign Trade Association, an aerial tour of the San Francisco Bay Region, sponsored by United Air Lines Transport Corporation, and an entire day and night on Treasure Island.

To head the organization for the coming year the following officers were elected:

President—**G. E. Arbogast,** President, Port of Los Angeles, Los Angeles, California.

Vice-President — **I. M. Stevens,** President, Port of Long Beach, Long Beach, California.

Vice-President—**K. J. Burns,** Port Manager, National Harbours Board, Vancouver, B. C.

Secretary-Treasurer—**D. A. Marshall,** Port Manager, Port of Long Beach, Long Beach, California.

Past President—A. H. Abel, Port Manager and Chief Engineer, Port of Oakland, Oakland, California.

Directors

B. C. Allin, Director of Port, Stockton, California.

J. W. Brennan, Port Director, Port of San Diego, San Diego, California.

J. A. Earley, Vice-President, Port

of Seattle, Seattle, Wash.

T. H. Banfield, Commissioner, Commission of Public Docks, Portland, Oregon.

H. W. Hunter, Commissioner, Port of Bellingham, Bellingham, Washington.

K. K. Reid, Chairman, New Westminster Harbour Commission, New Westminster, B. C.

Frank H. Gowdy, Manager, Port of Longview, Longview, Washington.

W. J. Murphy, Manager and Engineer, Port of Grays Harbor, Grays Harbor, Washington.

F. H. Marvin, President, Port of Tacoma, Tacoma, Washington.

M. H. Gates, Secretary, Board of State Harbor Commissioners, San Francisco, Calif.

Fred Epperson, Commissioner, Port of Port Angeles, Washington.

S. G. Tegtmeier, Commissioner, Port of Everett, Washington.

David Burrowes, President, Port of Port Angeles, Washington.

Martin Gottfeld, President, Port of Olympia, Washington.

H. J. Kesler, President, Port of Vancouver, Washington.

The 1939 business sessions of the convention were marked by the presentation of papers on various subjects of interest to the Port Authorities. Included in the discussions were the following:

The Forty-seventh Annual Meeting of the Society of Naval Architects will be held in the Jade Room of the Waldorf-Astoria Hotel, Park Avenue at 49th Street, New York, N. Y., on Thursday and Friday, November 16 and 17, 1939. The meeting will be preceded by Council meeting in the LePerroquet Suite of the Waldorf-Astoria on Wednesday, November 15, 1939. The Annual Banquet will be held on Friday evening, November 17, 1939, in the Grand Ballroom of the Hotel. Attendance at the banquet will be confined to the membership, with the exception of honor guests of the Society.

A dinner dance will be held on the Starlight Roof of the Waldorf-Astoria Hotel on Saturday evening, November 18, 1939.

The following is a list of the papers to be presented:

"Modern Tanker Design" by N. J. Pluymert, member.

"Ship Ratproofing," by P. W. Clark, member.

"Important Considerations in the Use of High Tensile Steel Rivets in Shipbuilding," by Rear Admiral W. G. DuBose, (CC) USN., Council member.

"Further Form Resistance Experiments," by Captain E. F. Eggert, (CC) USN., retired, visitor.

"General Diesel Marine Application," by Lt. Comdr. W. D. Leggett, Jr., USN., visitor

"Ship Plating Under Compression and Hydrostatic Pressure," by Henry W. Bengston, member.

"Graphical Analysis of Pipe Stresses," by Oscar I. Baggerud and Karl E. Jernstrom, members.

"Some Observations Regarding Merchant Marine Personnel," by Professor Herbert L. Seward, Council member.

"American Superliners — They Will Pay," by G. C. Gaede, visitor.

It is believed that the foregoing list of papers will prove of great interest, provoke much valuable discussion and thereby add to the wealth of technical knowledge of shipbuilding which has been accumulated by the Society and presented at its meetings.

THE CALIFORNIA NAUTICAL SCHOOL

The California Nautical School opened its gates to a class of sixty-five young men on March 4, 1931, this first class then reporting at the school's base at Tiburon on San Francisco Bay. Since that day five classes, totaling two hundred and four cadets, have been graduated from the school and licensed as third mates or third assistant engineers.

Activities of the school center aboard its training ship, California State. This vessel, a former "lake type" cargo steamer, was rebuilt by the navy and then loaned to the state for her present duty. As now fitted the California State is adequately equipped for service as an officers' training ship. The vessel has comfortable accommodations for twelve officers, one hundred and thirty two cadets, and a crew of seventeen. As modernized the ship is provided with a complete equipment of shops and the latest devices for instruction in seamanship, navigation, and marine engineering. The training ship is economical in operation and this permits an annual cruise of about four months and fifteen thousand miles duration.

The schoolship California left San Francisco on her first cruise in December, 1931, and returned to her base in May, 1932, after calling at Panama; Callao, Peru; Valparaiso, Chile; Magellanes, Chile; Buenos Aires, Argentina; Montevideo, Uruguay; Rio de Janeiro, Brazil; Port au Spain, Trinidad; Hampton Roads, Virginia; Washington, D. C.; Cristobal, C. Z.; San Diego, Los Angeles, and Santa Barbara, California.

The second long cruise took the cadets around the world leaving San

Officers and Members of the "Port of California Nautical School," San Francisco, August 30, 1939.

Francisco in December, 1932, and returned to base in June, 1933. On this cruise the Schoolship called at Honolulu, T. H.; Port Apra, Guam; Manila, P. I.; Singapore, Straits Settlements; Colombo, Ceylon; Port Said, Suez; Alexandria, Egypt; Naples, Italy; Capri, Italy; Villefranche, France; Barcelona, Spain; Gibraltar; Funchal, Madeira; Curacao, D.W.I.; Panama, C.Z.; San Diego, Los Angeles, and Santa Barbara, California.

The third cruise, in November-December, 1934, was comparatively short. This cruise was confined to California ports calling at Stockton, Oakland, Eureka, Crescent City, Santa Cruz, Monterey, Port San Luis, Santa Barbara, Los Angeles, Long Beach, and San Diego.

The 1935 cruise took the cadets to the Hawaiian Islands calling at Honolulu, Lahaina Roads, and Hilo.

The fifth cruise in 1936 took the Schoolship to U. S. Gulf ports via Los Angeles, Panama, C. Z.; Cartagena, Colombia; Vera Cruz, Mexico; Houston, Texas; Cristobal, C. Z.; San Diego, Los Angeles, and Santa Barbara, California.

Offshore again from November, 1936, to March, 1937, the Schoolship went "down under" to Papeete, Tahiti; Auckland, N. Z.; Melbourne, Australia; Sydney, Australia; Suva, Fiji Islands; Pago Pago, Samoa; Honolulu, T. H.; Hilo, T. H.; San Diego, Los Angeles, and Santa Barbara, California.

From January to April, 1938, the cruise was over a triangular course, California-Hawaiian Islands-Mexico. Stops were made at Honolulu, Lahaina Roads and back to Honolulu in the Hawaiian Islands. Thence to Acapulco, Mazatlan, and Magdalena Bay in Mexico. The last leg of the cruise brought the cadets home via San Diego, Los Angeles, and Santa Barbara, California.

The 1939 cruise, January to April, took the cadets down the West Coast of the American continent to San Diego, California; La Union, Salvador, Panama; Perlas Islands, Panama; Callao, Peru; Valparaiso, Chile; Panama, C. Z.; Manzanillo, Mexico; Long Beach, and Santa Barbara, California.

Thus it is seen that the California Nautical School Schoolship California State has traversed a well-rounded itinerary on her several cruises.

Classes enter the school about the first of August of each year. Candidates are selected by competitive examination, based upon the curriculum of a college preparatory high school course. These examinations result in the admission of young men who are fitted, mentally and physically, to meet the arduous scholastic course and exacting work requirements of the school.

The scholastic work is given in the buildings and shops of the shore base at Tiburon. Here the cadets enjoy the use of sixty acres of campus, and here the training ship is berthed at her own wharf for about seven months a year. The three year course is recognized by the California Department of Education as of college grade, the school's courses are accredited in the colleges of the state, and its graduates receive the degree of Bachelor of Science. The curriculum is broad in its scope, including courses of value in preparation of students for promotion to positions of responsibility in the shipping world. However, the primary purpose of the school is the development of young men who are temperamentally, and physically fitted into junior officers of a superior type of ships of the American merchant marine.

The California Nautical School, administered by the California State Department of Education, is under the command of Captain N. E. Nichols, U.S.N. (retired). Mr. George Barkley is executive officer and faculty president, and the engineering department is under Chief Engineer Richard C. Dwyer, well known as former chief engineer of several large passenger vessels.

Merchant Marine Conference

Lewis Luckenbach, chairman of the Merchant Marine Conference Committee, and Charles H. C. Pearsall, National President of The Propeller Club of the United States, have addressed the following message to "the American Marine Fraternity":

"On behalf of the American Merchant Marine Conference Committee and of the National Board of Governors of The Propeller Club of the United States, we extend to you a most cordial and sincere invitation to attend the Thirteenth Annual Convention of The Propeller Club of the United States and the American Merchant Marine Conference in New York, October 8, 9, 10 and 11, 1939.

"The Propeller Club, Port of New York, oldest and largest club in the organization, is anxious to be your host this year. Local and national committees are working to assure the largest and most interesting convention and conference in our history—and there is every indication that these objectives will be attained. In addition to the convention sessions, the important American Merchant Marine Conference will again be held for the presentation and discussion of problems affecting our industry. Strongly endorsed by the Maritime Commission, by government officials and leaders in American shipping affairs in all sections of the country, it will again provide a forum and a meeting place for American marine men of the sea, the rivers and the lakes.

"Particular attention is being given to arrangements for delegates' and visitors' enoyment of their stay in New York. Entertainment features will include informal gatherings, luncheons, the annual banquet, the annual golf tournament and—need we mention it?—the New York World's Fair.

"Plan NOW to be in New York in October. Lend your aid and assistance to the promotion, furtherance and support of the American Merchant Marine on the Rivers, the Lakes and the Sea!"

Pacific Marine Review presents the official program of this 13th annual convention:

Program

Thirteenth Annual Convention

Sunday—October 8

4:00 to 11:00 P. M. Registration.

MORMACWREN

A-E-CO equipped! MORMACWREN is the third of six U. S. Maritime Commission C-2 Vessels, under construction at Sun Shipbuilding & Dry Dock Company, to be completed. All six are A-E-CO equipped with:

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1-50 HP Electric Windlass
1-35 HP Electric Gypsey
18-50 HP Electric Cargo Winches

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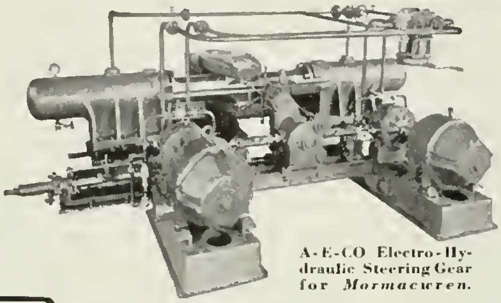
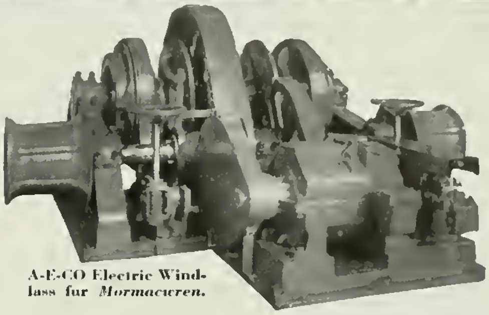


A-E-CO Electro-Hydraulic Steering Gear for *Mormacwren.*



A-E-CO Electric Windlass for *Mormacwren.*

A-E-CO DECK Auxiliaries

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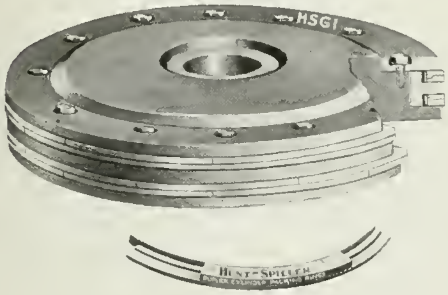

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8:00 P.M. Meetings of National Committees
Credentials Committee
Constitution and By-Laws Committee
Overseas Propeller Clubs Committee
Essay and Poster Contest Committee
Nomination Committee
Resolutions Committee
Student Ports Committee
Committee Rooms to be announced.

8.00 P.M. National Board of Governors Meeting
Room to be announced.

9:00 P.M. Informal reception for delegates and visitors by the Propeller Club, Port of New York
Starlight Roof

Monday—October 9

8.00 A.M. Registration

10:00 A.M. Opening Session. The Propeller Club of the United States
Starlight Roof

10:00 A.M. Meeting of the Women's Organization for the American Merchant Marine, Inc.
Jansen Suite

1:00 P.M. Annual Propeller Club Golf Tournament
Pomonok Country Club

2:00 P.M. Visit to New York World's Fair

9:00 P.M. The President's Reception and Dance tendered by the Propeller Club, Port of New York
Place to be announced

Tuesday—October 10

8:30 A.M. Registration

9:30 A.M. First Session, American Merchant Marine Conference
Starlight Roof

12:30 P.M. Luncheon tendered by the Propeller Club, Port of New York to the members of the American Merchant Conference Committee and National Board of Governors of the Propeller Club of the United States
Jansen Suite

1:00 P.M. Luncheon tendered by the Women's Organization for the American Merchant Marine to visiting ladies

2:00 P.M. Second Session, American Merchant Marine Conference
Starlight Roof

7:00 P.M. Thirteenth Annual Banquet of the Propeller Club of the United States in conjunction with the American Merchant Marine Conference Committee and the Women's Organization for the American Merchant Marine
Grand Ball Room

10:00 P.M. Grand Ball

Wednesday—October 11

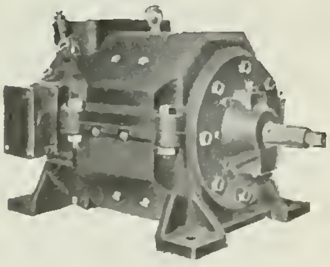
8:30 A.M. Registration

9:00 A.M. Second Session, The Propeller Club of the United States
Starlight Roof

9:30 A.M. Meeting of the Women's Organization for the American Merchant Marine
Jansen Suite

12:00 Noon National Board of Governors' Meeting
Starlight Roof

ELECTRO DYNAMIC WORKS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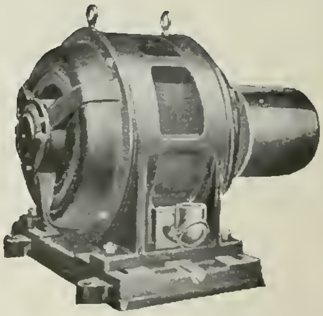
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Averages Better than 10 Knots on Trial Run

● When R. D. Suryan, president of the Far North Packing & Shipping Company and a former salmon fisherman himself, had the old sailing vessel *Ruby* overhauled, a 5-cylinder Model 37 Fairbanks-Morse Diesel was installed for propulsion power. This engine, with a capacity of 450 hp. at 360 R.P.M., drives a 66 x 42 three-blade propeller. The newly overhauled vessel did better than 10 knots on the trial run.

The *Ruby* will be used by the Far North Packing & Shipping Company to take men and supplies to its salmon plant at Alitak Bay on Kodiak Island, Alaska and to bring back the pack at the end of the season. She will also probably be used in freight service in and out of Seattle.

The popularity of Fairbanks-Morse Diesels among fishermen for propulsion and auxiliary power is not a coincidence. Dependability, safety, low operating cost, and world-wide accessibility to service are a few of the reasons. All of them add up to more profitable operation. If you build or convert—get in touch with your nearest Fairbanks-Morse branch service station. You'll be glad you did. Write Dept. 109, Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill. Branches with service stations in principal ports.

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Building in American Yards

Direct Reports from Yards as of September 1, 1939

Pacific Coast

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
(Union Plant)
San Francisco

DRYDOCK AND ROUTINE REPAIRS: Knud Rasmussen, Tug A. G. Wells, Vitus Bering, Admiral Halstead, Makaweli, F. H. Hillman, Leikanger, Peter Lassen, Coya, Matsonia, State Dredge No. 4, M.S. W. B. Walker, M.S. Hauraki, President Taft.

THE CAMPBELL MACHINE CO.
Foot of Eighth St.
San Diego, Calif.

DRYDOCK AND ROUTINE REPAIRS: Santa Amaro, Conte Blanco, Golden Gate, Miss America, Star of the Sea, Stella Di Genoa.

GENERAL ENGINEERING & DRY DOCK CO.
Foot of Fifth Avenue
Oakland, Calif.

DRYDOCK AND ROUTINE REPAIRS: Tug Arabs, Derrick Barges Nos. 1 and 34, Makawao, El Aguador, Mana, Makua, Manini, Malama, Lighthouse Tender Lupine, Esther Johnson.

HARBOR BOAT BUILDING CO.
Berth 264, Fish Harbor
Terminal Island, Calif.

NEW CONSTRUCTION

Madeirense, tuna bait fishing vessel 125′ x 28′ x 14′; 500 gross tons; for Madeirense Inc., San Diego, Calif. 600 H.P. Fairbanks Morse main diesel engine; 3 auxiliaries, 450 total H.P.; 12 knots speed; cost $185,000; quick freezing refrigeration. Launching date, November, 1939; delivery date, January, 1940.

LAKE WASHINGTON SHIPYARDS
Houghton, Wash.

NEW CONSTRUCTION: **200 foot steam geared turbine steel survey ship Explorer for U. S. Coast & Geodetic Survey. Launching date, October 14, 1939;** estimated delivery date, January 1, 1940.

LOS ANGELES SHIPBUILDING & DRY DOCK CORP.
Los Angeles Harbor
San Pedro, Calif.

DRYDOCK AND ROUTINE REPAIRS. Arcata, W. T. Borax Barge No. 10, Eureka, F. B. Sea Boy, Scotia, Raby Castle, M. S. British Columbia Express, Kainalu, M. S. Korshamn, Olympic.

MARE ISLAND NAVY YARD
Mare Island, Calif.

NEW CONSTRUCTION:

Tuna, submarine (SS203); keel laid July 19, 1939.

Gudgeon, submarine (SS211); order received for construction on June 2, 1939.

Fulton, submarine tender (AS11); keel laid July 19, 1939.

DRYDOCK AND ROUTINE REPAIRS: New Orleans, Philadelphia, Aylwin, Henley, Helm, Fanning, Craven, Blue, Mugford, Ralph Talbot, Patterson, Jarvis, Brant, Pyro, Selfridge, Rail.

THE MOORE DRY DOCK CO.
Oakland, Calif.

NEW CONSTRUCTION:

Hull No. 194, Fir, lighthouse tender for Bureau of Lighthouses; LOA 174′ 10½″, beam molded 32′, depth 14′ 6″. Twin screw triple expansion engine; water tube boiler; 1000 horsepower. Keel laid December, 1938; launched March, 1939; **delivery date, September 14, 1939.**

Hulls Nos. 195, Sea Arrow, and 196, two cargo vessels for U. S. Maritime Commission: LOA 492′ 0″, LBP 465′, breadth molded 69′ 6″, depth molded 42′ 6″, SHP normal 8500, SHP max. 9350, dis. 17,600 tons, deadweight 11,926 tons; steam turbine propelled. No. 195, keel laid March 18, 1939; **launched September 15, 1939.**

THE PUGET SOUND NAVY YARD
Bremerton, Washington

NEW CONSTRUCTION:

Charles F. Hughes (Destroyer No. 428): standard displacement 1600 tons; order placed by Navy Department December 7, 1937. Keel laid January 3, 1939.

Monssen (DD436); keel laid July 12, 1939.

Woban (YT138).

Ala (YT139).

Ships authorized, work not started: Barnegat (AVP10), seaplane tender; Biscayne (AVP11), seaplane tender; Casco (AVP12), seaplane tender; Mackinac (AVP13), seaplane tender.

DRYDOCK AND ROUTINE REPAIRS: Colorado, Utah, Houston, Minneapolis, Astoria, West Virginia.

TODD SEATTLE DRY DOCKS, INC.
Harbor Island
Seattle, Wash.

DRYDOCK AND ROUTINE REPAIRS: M.S. Oregon, Herman Frasch, Katrina Luckenbach, Barge DLCO No. 31, Alaska Standard, Edward Luckenbach, North Sea, Depere, Robert Luckenbach, Baranof, M.S. Standard Service, M.S. Djambi.

WESTERN BOAT BUILDING CO., INC.
2505 East 11th Street
Tacoma, Wash.

NEW CONSTRUCTION:

Hull No. 140, purse seine fishing vessel, 81′ x 21′ x 11′; 220 H. P. Atlas Diesel engine. Delivery date, November 30, 1939.

DRYDOCK AND ROUTINE REPAIRS: Sea Pirate, Robert B. Stanford; Tacoma Tug and Barge Co., 4 Barges.

Atlantic, Lakes, Rivers

AMERICAN BRIDGE COMPANY
Pittsburgh, Pa.

NEW CONSTRUCTION:

One relay barge 104′ x 34′ x 8′ for the Panama Canal. Delivery date January 1, 1940.

Seven double deck covered barges 198′ x 35′ x 11′ for Mississippi Barge Line Co., St. Louis, Mo.

BATH IRON WORKS
Bath, Maine

NEW CONSTRUCTION:

Hull No. 171, DD410, Hughes, 1500-ton destroyer for U. S. Navy; contract date October 12, 1936; keel laid September 15, 1937; launching date June 17, 1939; **delivery date September, 1939.**

Hulls Nos. 177 and 178, DD423 and DD424, two 1620-ton destroyers for U. S. Navy. Contract date September 30, 1937; delivery dates April and June, 1940, respectively.

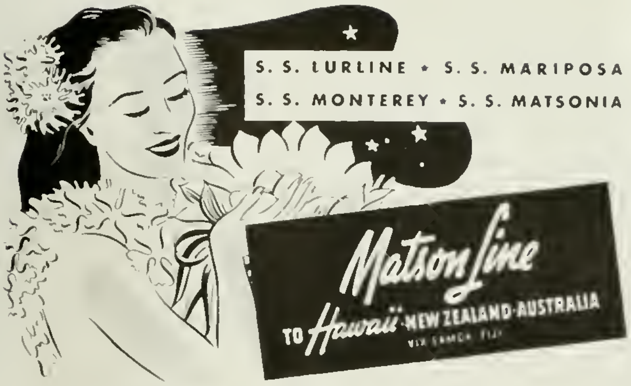
Hulls Nos. 180-181, DD429 and DD430; two 1620 ton destroyers for U. S. Navy. Contract dated August 15, 1938; delivery dates, December, 1940, and February, 1941, respectively.

Hulls Nos. 182-183, DD437 and DD438, two 1620-ton destroyers for U. S. Navy. Contracts dated June 15, 1939. Delivery dates June 15, 1941, and August 15, 1941.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Fore River Yard
Quincy, Mass.

NEW CONSTRUCTION:

CV7, Wasp, Airplane Carrier for U. S. Government; keel laid April 1, 1936; launched April 4, 1939.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THE OCEANIC STEAMSHIP COMPANY
San Francisco Los Angeles San Diego Seattle Portland

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Hull No. 1469, Cristobal; passenger and freight steamer for Panama Railroad S.S. Co.: 486 feet x 64 feet x 38 feet 6 inches; 16½ knot speed. Keel laid November 15, 1937; launching date, March 4, 1939; **delivered August 11, 1939.**

Hulls Nos. 1470 and 1471, two 1500-ton destroyers for U. S. Government; delivery dates March, 1940 and May, 1940.

Hulls Nos. 1474, 1475, 1476 and 1477, four freight vessels for American Export Lines, Inc.; 450′ B.P. x 66′ x 42′3″; 16½ knots; geared turbines and water tube boilers. Keels laid, No. 1474, November 10, 1938; No. 1475, December 16, 1938; No. 1476, March 16, 1939; No. 1477, July 27, 1939. Launching dates, No. 1474, July 18, 1939; No. 1475, September 16, 1939.

Hull No. 1478, Massachusetts; 35,000 ton battleship for U. S. Navy.

Hulls Nos. 1479 and 1480, two 6000-ton cruisers for U. S. Government.

BETHLEHEM STEEL COMPANY, INC.

Shipbuilding Division
Sparrows Point Yard
Sparrows Point, Md.

NEW CONSTRUCTION:

Hulls Nos. 4329, Platte; 4330, Esso Annapolis; 4331; three 16,300 dwt. ton tankers for Standard Oil Co. of N. J.; 18 knots speed. Contract signed January 3, 1938. No. 4329 launched July 8, 1939. No. 4330, keel laid December 21, 1938; **launched September 9, 1939.**

Hulls Nos. 4337, Delbrazil; No. 4338, Deltargentino; and No. 4339, Delorleans; three passenger and cargo ships for Mississippi Shipping Co. Contract signed December 21, 1938. Keels laid, No. 4337, April 10, 1939; No. 4338, May 8, 1939. Launching date, No. 4337, December 16, 1939. Delivery dates, No. 4337, June 1, 1940; No. 4338, September 1, 1940; No. 4339, December 1, 1940.

Hull No. 4340, tanker for Union Oil Co. of Calif. Contract signed May 1, 1939. Keel laid July 18, 1939.

BETHLEHEM STEEL COMPANY, INC.

Shipbuilding Division
Staten Island Yard
Staten Island, N. Y.

NEW CONSTRUCTION:

Hulls Nos. 8001, Navajo; 8002, Seminole; and 8003, Cherokee—three U. S. Navy fleet tugs. No. 8001, keel laying date December 12, 1938; launching date, August 17, 1939; delivery date February 15, 1940. No. 8002, keel laying date December 16, 1938; **launching date September 15, 1939;** delivery date April 15, 1940. No. 8003, keel laying date, December 23, 1938; **launching date, October 14, 1939 (tentative);** delivery date, June 15, 1940.

BROOKLYN NAVY YARD

Brooklyn, N. Y.

NEW CONSTRUCTION:

CL 50, Helena, light cruiser; L.B.P. 600′ beam 61′7¾″, standard displacement 10,000; geared turbine engines; express type boilers; keel laid December 9, 1936; launched August 27, 1938; estimated delivery November 2, 1939.

BB 55, North Carolina, battleship; L.B.P. 714′ 0″, beam to outside armor 108′ 0″, std. displ. 35,000 tons; geared turbine engines; express type boilers. Keel laid October 27, 1937; estimated launching date March 1, 1940; contract delivery September 1, 1941; estimated delivery date October 15, 1941.

Battleship No. 61, order placed June 2, 1939; to be built under authority of Naval Appropriation Act for year 1940. Building period 49 months, beginning July 1, 1939.

IRA S. BUSHEY & SONS, INC.

Foot of Court Street
Brooklyn, N. Y.

NEW CONSTRUCTION: **D. T. Sheridan, all-welded ocean-going tug** for Sheridan Towing Co., of Philadelphia, Pa. 116′ x 26′ x 13′; powered by 1000 H. P. Fairbanks-Morse diesel. Launched July 5, 1939; **delivery date, October 1, 1939.**

CHARLESTON, S. C., NAVY YARD

Charleston, S. C.

NEW CONSTRUCTION:

One harbor tug, Heekon (YT141); LOA 100′, beam 25′; authorized July 7, 1938.

One harbor tug, Nokomis (YT142); LOA 100′, beam 25′; authorized July 7, 1938.

Six destroyers.

Two destroyers, DD443, Swanson; and DD444, Ingraham; authorized March 27, 1934.

One harbor tug, YT143, Small.

DEFOE BOAT & MOTOR WORKS

Bay City, Mich.

NEW CONSTRUCTION:

Hull No. 166, sub-chaser PC-451, for U. S. Navy. Diesel driven; 170′ x 21′ 6″. General Motors engines; steel construction. Delivery date June, 1940.

THE DRAVO CORPORATION

Engineering Works Division
Pittsburgh, Pa., and Wilmington, Del.

NEW CONSTRUCTION:

Hull No. 1555, one welded steel auto barge 175′ x 30′ x 10′ 8″ for stock; 546 gross tons.

Hull No. 1567, one welded flush deck cargo box barge 100′ x 26′ x 6′ 6″ for stock; 165 gross tons.

Hulls Nos. 1569-1572, four welded flush deck cargo box barges 130′ x 30′ x 7′ 6″ for stock; 1000 gross tons.

Hulls Nos. 1573-1574, two welded steel coal barges 134′ x 34′ x 17′ for stock; 1534 gross tons.

Hulls Nos. 1575-1577, three welded steel oil barges 195′ x 35′ x 10′ for stock; 1833 gross tons.

Hulls Nos. 1578-1579, two welded steel coal barges 134′ x 34′ x 17′ for stock; 1534 gross tons.

Hull No. 1580, one 225 cu. yd. welded dump scow 115′ x 28′ x 7′ 6″ for stock; 120 gross tons.

Hull No. 1582, one welded steel dredge hull 72′ x 36′ x 5′ for Kosmos Towing Co., Louisville, Ky.; 118 gross tons.

Hull No. 1583, one welded steel derrick boat hull 60′ x 36′ x 7′ for American Construction Co., Cleveland, O.; 135 gross tons.

Hulls Nos. 1584-1593, ten welded steel coal barges 175′ x 26′ x 11′ O. A. for stock; 4720 gross tons.

ELECTRIC BOAT CO.

Groton, Conn.

NEW CONSTRUCTION:

Hull No. 33, Seadragon (SS194); 1450 tons; keel laying date April 18, 1938; launched April 21, 1939; **delivery date, October, 1939.**

Hull No. 34, Sealion (SS195); 1450 tons; keel laying date June 20, 1938; launched May 25, 1939; delivery date December, 1939.

Hull No. 35, Tambor (SS198); standard displacement 1475 tons; keel laying date January 16, 1939; delivery date August, 1940.

Hull No. 36, Tautog (SS199); standard displacement 1475 tons; keel laying date March 2, 1939; delivery date October, 1940.

Hull No. 37, Thresher (SS200); standard displacement 1475 tons; keel laying date May 15, 1939; delivery date December, 1940.

Hull No. 39 Gar (SS206); standard displacement 1475 tons.

Hull No. 40 Grampus (SS207); standard displacement 1475 tons.

Hull No. 41 Grayback (SS208); standard displacement 1475 tons.

Hull No. 42, Mackerel (SS204); standard displacement 800 tons.

THE FEDERAL SHIPBUILDING AND DRY DOCK COMPANY

Kearny, N. J.

NEW CONSTRUCTION:

One destroyer, DD412 Hammann; keel laid January 17, 1938; launching date February 4, 1939; **delivered August 10, 1939.**

Hull No. 153, tanker for Standard Oil Co. of New Jersey; keel laid March 13, 1939.

Hulls Nos. 155-159, five C-2 cargo vessels for U. S. Maritime Commission. Keels laid, No. 155, September 20, 1938; No. 156, January 3, 1939; No. 157, March 16, 1939; Nos. 158 and 159, May 26, 1939; launching dates, No. 155, May 20, 1939; No. 156, July 15, 1939; **No. 157, September 30, 1939 (tentative); delivery date, No. 155 (Red Jacket), September 6, 1939 (tentative).**

Hulls Nos. 160 and 161, two torpedo boat destroyers for the United States Navy. Keels laid March 1, 1939.

Hulls Nos. 162-167, six C-3 cargo vessels for U. S. Maritime Commission. Keel laid, No. 162, May 8, 1939.

Hulls Nos. 168-169, two 6000 ton cruisers for U. S. Navy.

Hulls Nos. 170-171, two torpedo boat destroyers for the United States Navy.

LEVINGSTON SHIPBUILDING CO.

Orange, Texas

NEW CONSTRUCTION:

One all welded towboat; LOA 80′, beam OA 22′ 7″, depth 9′ 6″. Powered by 550 H.P. diesel. For W. G. Coyle & Co., New Orleans, La.

One all welded oil barge 173′ x 39′ x 8′ 6″ for Higman Towing Co., Orange, Texas. Two pumping units. **Delivery date, September, 1939.**

One all welded diesel electric automobile and passenger ferry 185′ 2½″ LOA x 55′ beam over guards x 15′ 6″ deep, for The Electric Ferries, Inc., NYC. Powered with 950 H.P. General Motors diesel with one 750 H.P. propelling motor. Delivery date, January 1, 1940.

THE NEW YORK SHIPBUILDING CORPORATION

Camden, N. J.

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Head Office: 120 Wall Street, New York

NEW CONSTRUCTION:

One destroyer tender for U. S. Navy; order placed December 27, 1937. Launched May, 1939.

One seaplane tender for U. S. Navy; order placed December 27, 1937.

One destroyer tender for U. S. Navy; order placed October 14, 1938.

One seaplane tender for U. S. Navy; order placed October 14, 1938.

One battleship for U. S. Navy; order placed December 1, 1938. Keel laid July, 1939.

One repair ship for U. S. Navy; order placed July 20, 1939.

NEWPORT NEWS SHIPBUILDING & DRYDOCK CO.

90 Broad Street, New York

NEW CONSTRUCTION:

Hulls Nos. 363-364, two destroyers, Nos. 413, Mustin, and 414, Russell; keels laid December, 1937; launched December 8, 1938.

Hull No. 369, twin screw mail, passenger and cargo liner for United States Lines Co.; length 723′, beam 92′, depth 45′. Keel laid August 22, 1938; launching date, August 31, 1939.

Hulls Nos. 370, 371 and 372, three oil tankers for Standard Oil Company of New Jersey; gross tonnage about 11,500 tons; L.B.P. 525′, breadth molded 75′, depth molded 39′. Keels laid, No. 370, January 16, 1939; No. 371, May 8, 1939.

Hulls Nos. 373, 374, 375 and 376, four single screw cargo vessels for United States Maritime Commission; turbine propulsion; gross tonnage, Nos. 373 and 374, about 7300 tons; Nos. 375 and 376, about 8000 tons; length 435′, breadth 63′, depth 40′ 6″. Keels laid, No. 373, November 14, 1938; No. 374, November 28, 1938; No. 375, March 6, 1939; No. 376, May 1, 1939. Launching dates, No. 373, April 28, 1939; No. 374; June 21, 1939.

Hull No. 378, battleship, 58, Indiana, for U. S. Navy.

Hulls Nos. 379, 380, 381, 382, 383 and 384, six single screw combination passenger and cargo vessels for U. S. Maritime Commission; length 465′, breadth 69′ 6″, depth 42′ 6″, gross tonnage about 9100 tons.

Hull No. 385, aircraft carrier No. 8, Hornet, for U. S. Navy.

PORTSMOUTH, N. H., NAVY YARD

Portsmouth, N. H.

NEW CONSTRUCTION:

Seven submarines, Searaven, Seawolf, Triton, Trout, Marlin, Grayling and Grenadier.

THE PUSEY & JONES CORP.

Wilmington, Del.

NEW CONSTRUCTION:

Hull No. 1071, one steel lighthouse tender, Lilac Class, for Dept. of Commerce, Bureau of Lighthouses. Gross tonnage approximately 700 tons. Keel laid October 17, 1938; **completion date, September 16, 1939.**

Two streamlined diesel tugs for Curtis Bay Towing Company; powered by 320 H.P. Enterprise engines; cost $200,000. **Launching date, October, 1939;** delivery date, November, 1939.

SUN SHIPBUILDING AND DRY DOCK COMPANY

Chester, Pa.

NEW CONSTRUCTION:

Hulls Nos. 178-180, three single screw diesel cargo vessels, C-2 design, for U. S. Maritime Commission; equipped with Sun-Doxford engines. **Delivery dates, No. 178, September 22, 1939; No. 179, October 13, 1939; No. 180, October 27, 1939.**

Hull No. 181, single screw steam turbo electric drive tanker for Atlantic Refining Co.; 521′ x 70′ x 40′. Keel laid November 21, 1938; launched July 29, 1939; **delivery date September 15, 1939.**

Hulls Nos. 182, 183, 184 and 185, four single screw diesel cargo vessels for U. S. Maritime Commission, C-3 design. Equipped with Busch Sulzer engines. Delivery dates November 15, 1939; December 20, 1939, January 20, 1940, and February 20, 1940.

Hulls Nos. 186-189, four C-3 single screw combination passenger and cargo vessels; diesel propelled; equipped with Sun-Doxford engines. Delivery dates October 6, 1940; December 5, 1940; February 3, 1941, and April 4, 1941.

Hull No. 190, one 16-knot tanker for Texas Co.; single screw steam turbine; 13,285 tons dwt. Delivery date, June, 1940.

Hulls Nos. 191-192, two single screw steam turbine railroad car carriers for Seatrain Lines, Inc. Keels laid July 28 and August 17, 1939; delivery dates April 15, 1940, and June 1, 1940.

TAMPA SHIPBUILDING & ENGINEERING CO.

P. O. Box 1838

Tampa, Fla.

NEW CONSTRUCTION:

Hulls Nos. 33-36, four C-2 type cargo vessels for U. S. Maritime Commission; 459′ x 63′ x 31′ 6″; 9291 dwt. tons; diesel powered; cost $1,808,413 each. **Estimated launching date, October 31, 1939.**

Five C-1 type turbine-propelled cargo vessels for United States Maritime Commission; $1,814,430 each.

Flying Cloud Launched

Mrs. Emma Guffey Miller, sister of Senator Joseph F. Guffey, of Pennsylvania, sponsored the U. S. Maritime Commission's vessel, Flying Cloud, which was launched at the Federal Shipbuilding and Dry Dock Company yards, Kearny, New Jersey, on Saturday, September 30.

She was the 23rd ship to be launched in the Maritime Commission's construction program, and the eleventh of the commission's C-2 design to enter the water. When completed she will be placed in operation on the Government-owned American Hampton Roads-Yankee Line. Her dimensions are:

Deadweight tonnage	9,758
Length overall	459 ft.
Breadth	63 ft.
Draft loaded	25 ft. 9 in.
Sustained sea speed loaded	15½ knots
Cargo capacity, tons	7,994
Operating radius, miles	13,000
Displacement	13,900
Gross tonnage	6,085

This site on the mud flats of the harbor of Tacoma, Washington, once proudly supported the Tacoma plant of the Todd Shipbuilding Company and launched many fine ships from its ways. It will soon again be a busy hull-erecting plant, under the management of the Seattle-Tacoma Shipbuilding Company.

PACIFIC
MARINE
REVIEW

NOVEMBER, 1939

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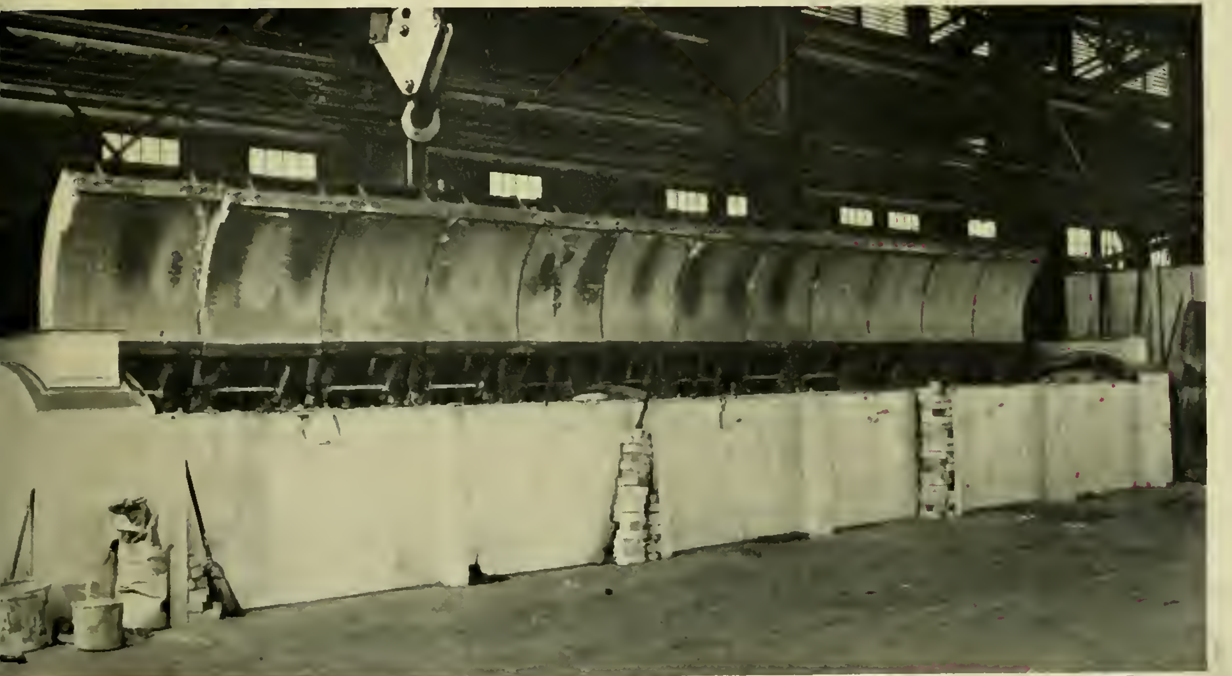

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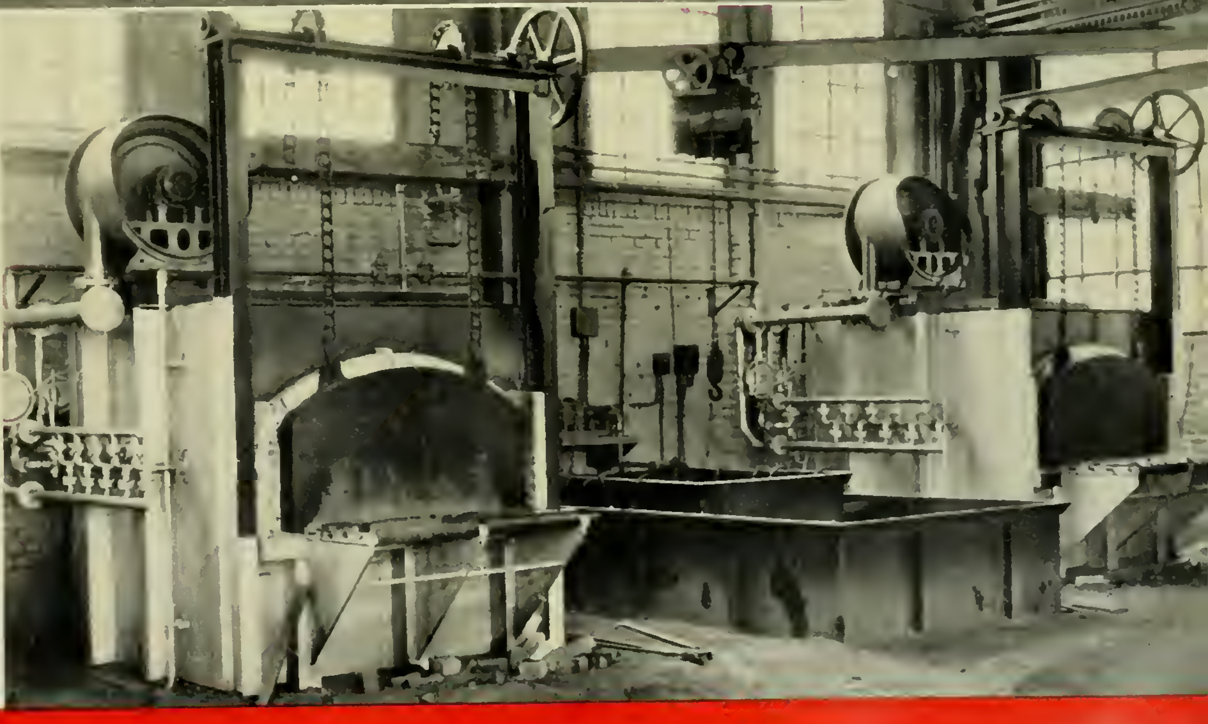

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FRANK LLOYD'S PRODUCTION

"RULERS
OF THE SEA

with DOUGLAS FAIRBANKS, JR.

ASSOCIATE DIRECTOR: JAMES HAVENS

Note: All sails and rigging used on the ships "Fal Greenock" and "Dog Star" were made by Tom D veteran Pacific Coast sailmaker.

* In the Northwest, this grade of Marine Rope is kn "Cloverleaf Manila".

When "Rulers of the Sea", Paramount Pictures' great epic of the pioneer days of the merchant marine, was to be filmed, two completely rigged ships were required, utilizing many thousands of pounds of rope.

In selecting this rope, Paramount and Sailmaker Tom Doyle took no chances on quality. They selected the rope that in its own right has been the "Ruler of the Sea" for generations — famous EXTRA SUPERIOR MANILA (in the Northwest, Portland Cloverleaf Manila).

In "real life" as well as "reel life", most ship operators of the Pacific depend upon Tubbs and Portland Marine Rope in port or at sea. They know that it guarantees safety and dependability at lowest operating cost.

(*Upper left*): The full rigged sailing vessel "Falcon of Greenock". (*Above in circle*): the steam side wheeler "Dog Star" as seen from the deck of the "Falcon". Both ships rigged exclusively with Extra Superior Manila.

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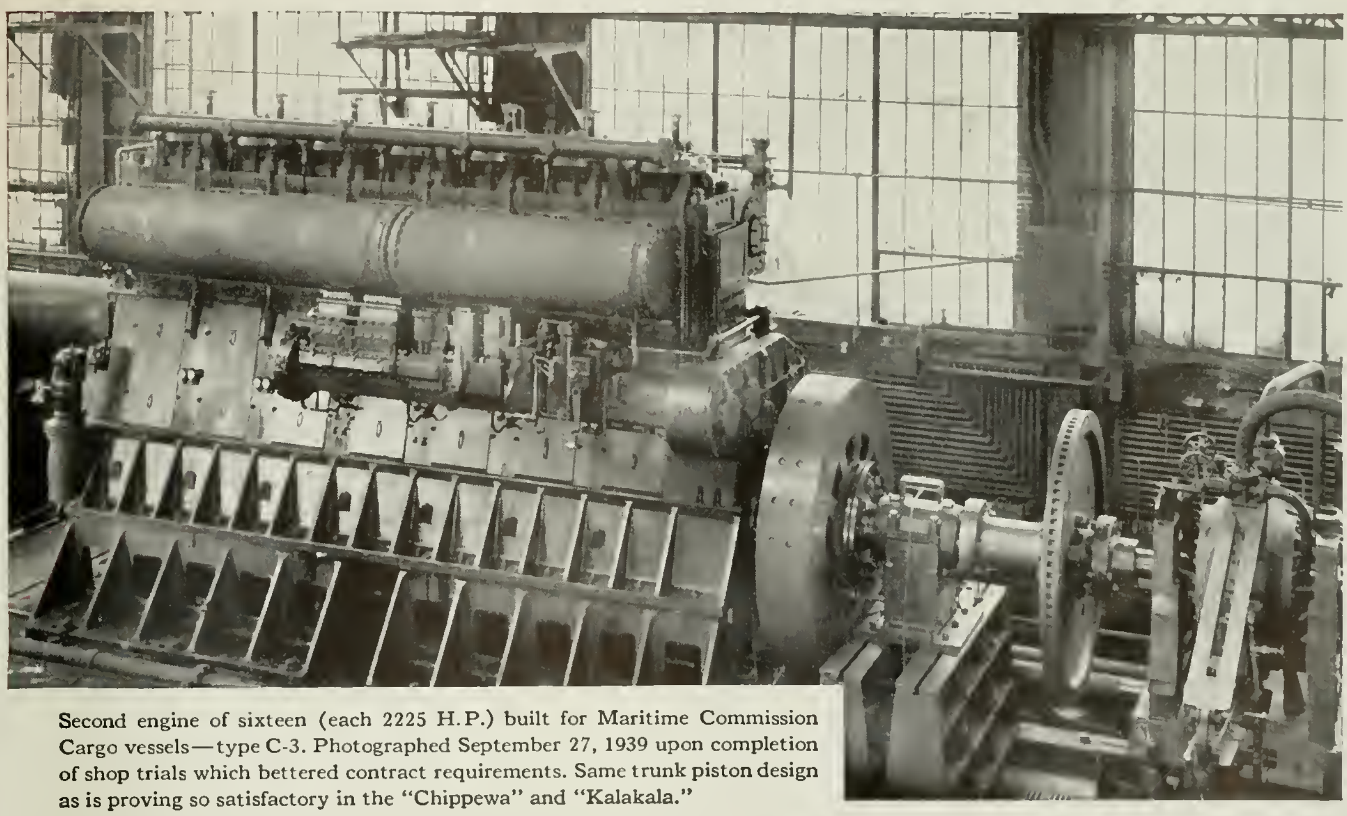
Already the "Chippewa" has covered well over 800,000 miles. Her Busch-Sulzer Diesel engine has provided better than 50,000 hours—her schedules have been consistently maintained without a single day's loss of service due to engine breakdown or failure. Original liners, pistons, cylinder heads are still in service.

Here's one ship that knows that a million miles is only the starting point for a long, useful Diesel life.



Second engine of sixteen (each 2225 H.P.) built for Maritime Commission Cargo vessels—type C-3. Photographed September 27, 1939 upon completion of shop trials which bettered contract requirements. Same trunk piston design as is proving so satisfactory in the "Chippewa" and "Kalakala."

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Official Organ

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Steamship Association

Shipowners Association
of the Pacific Coast

PACIFIC MARINE REVIEW

Contents - November, 1939

American Shipping and Neutrality Legislation 21

1914—Ocean-Going Tonnage—1939 23
Growth and Development of the Merchant Marine in International Trade.
By A. H. Haag.

New Ocean Greyhounds Round the World 27

Fine Steel Hull for Million-Dollar U. S. Coast and Geodetic Survey Boat Launched 30
By C. F. A. Mann.

Refrigeration Loads—Pacific Coast Tuna Clippers 33
By D. W. Dickie, N. A.

International Fisheries Law 35
By A. J. Early.

Comment on Fisheries Law Paper 36
By Joseph Walter Bingham.

Beachcomber's Loot 38

Your Problems Answered 40
Feed Water Treatment. II Basic Considerations.
By "The Chief."

Steady As You Go! 43
New Examination Requirements for American Deck Officers.

On the Ways 48
Latest News from American Shipyards.

Marine P. & I. Insurance 51
By Capt. Edward C. Holden.

Building in American Yards 62

Miscellaneous: Electric Motor of Tomorrow, 32; Engineers' Licenses, 42; A New Line of Marine Propulsion Speed Reducers, 42; Deck Officers' Licenses, 43; Change of Masters, 45; Safe-Line Wire Rope Clamp, 45, Main Propulsion Gears for C-3s at Moore's, 46; Space-Saving Noise Snubbers, 46; Gas-Fired Furnaces for Pacific Coast Shipyards, 47; Small "V" Type Marine Diesel, 47; Rate of Flow and Liquid Level Indicator, 50; Trade Literature, 50; New First Aid Kit Approved, 52.

PUBLISHED AT 500 SANSOME STREET. . . . . SAN FRANCISCO

Entered as second class matter June 20, 1913, at the post office, San Francisco, under the Act of March 3, 1879. Published on the 1st of each month. Advertising and editorial forms close on the 15th. Subscription price, one year: Domestic, $1.50; foreign, $2.50; two years: Domestic, $2.50; foreign, $4.00; three years: Domestic, $3.00; foreign, $5.50; single copies, 25c. Chas. F. A. Mann, Northwest Representative, 1110 Puget Sound Bank Bldg., Tacoma, Washington. New York Office, Suite 404-405-406, Two Hundred Broadway, Telephone COrtlandt 7-3579.

In New York City copies of Pacific Marine Review can be purchased at the news stands of I. Goldberg, 42 Broadway; Harry Nash, 17 Battery Place; Philip Mandara, Greenwich Street and Battery Place. In Washington, D. C., at the news stand of the Carlton Hotel, 16th and K Streets.

J. S. Hines	B. N. DeRochie	Paul Faulkner	Alexander J. Dickie	F. Dryden Moore
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VOLUME 36
No. 11

PACIFIC
MARINE
REVIEW

NOVEMBER
1939

American Shipping and Neutrality Legislation

American shipping interests are put on the spot just now in connection with the proposed Neutrality Act, so-called, which is under debate in Congress. Many organizations have memorialized Congress in an effort to show that body the foolishness of tying up American shipping at this time. Many ship-owners are in Washington urging legislation along the lines of accepted International Law for neutrals in time of war.

Perhaps the best statement from the American ship operators' point of view is that addressed to President Roosevelt by the Marine Association of New York. No sane American wants to get America into this war, but many sane Americans apparently think that only by sacrificing rights for which we have fought past wars can we hope to stay out of this one. All such should study this carefully-prepared statement, which lays down in lettered paragraphs the arguments for joining the other neutral maritime nations in operating the merchant fleets of the world under well-recognized principles of International Law. The text of the statement follows:

(a) Under the proposed Neutrality Act, vessels of United States registry are prohibited from carrying passengers or cargo to any country which the President by proclamation declares is in a state of war. This prohibition extends also to the dominion and colonial possessions of such countries, so that a large percentage of the ocean-borne foreign commerce of the world may be closed to American ships.

(b) The threat which this legisaltion holds to the domestic and foreign commerce of the United States is apparently not well understood. The great grain-growing sections of the West, the cotton states of the South, the industrial sections of the whole country, are vitally dependent upon the maintenance and development of our foreign trade. Without American ships in the present crisis to carry our farm and manufactured products to world markets, our internal domestic economy will be seriously depressed and unemployment will be materially increased.

(c) Many of our industries are also wholly dependent upon an adequate supply of certain raw materials such as rubber, tin, palm oil, jute, manganese ore, chrome ore. These materials are vital to our national defense. As in previous wars, there has already been a large withdrawal of foreign flag tonnage. This shortage becomes acute with continually mounting freight rates. The disastrous effect of the proposed restriction in the operation of American ships upon our farmers, labor and industry in this country will be calamitous and incalculable.

(d) The proposed Neutrality Act would be a grievous blow to our merchant marine and to our inland transportation, our railroads, inland waterways and motor truck industry. It will throw our American seamen, waterfront workers, ship repair yard workers and many other classes of employees, out of employment. It places an unreasonable, unfair and unnecessary burden upon maritime labor and all persons engaged in

Pacific Coast Merchant Shipbuilding

Yard	*Location*	*No. and Type*	*Cost*
Moore Dry Dock	Oakland, Calif.	Four C-3 C.S.S.	$11.221.520
Bethlehem Union Plant	San Francisco, Calif.	Five C-1 C.S.S.	10.010.000
Western Pipe & Steel	San Francisco, Calif.	Five C-1 C.M.S.	10.635.000
Consolidated Steel Corp.	Los Angeles, Calif.	Four C-1 C.S.S.	7.560.000
Seattle-Tacoma S. B. Corp.	Tacoma, Wash.	Five C-1 C.M.S.	10.635.000
TOTAL		23 ships	$50.061.520

MERCHANT SHIPS BUILDING FOR PACIFIC COAST LINES

Yard	*Line*	*No. and Type*	*Cost*
Newport News S. B. & D. D. Co.	American Pres. Lines	Seven C-3 Comb. S.S.	$25,410,000
Sun S. B. & D. D. Co.	Standard Oil, Calif.	One tanker	2.000.000
TOTAL MERCHANT SHIPS		31 ships	$77.471.520

the shipping and allied trades.

(e) The suggestion that American-flag tonnage so displaced can be employed in the carrying trades of the Western Hemisphere is not supported by the facts. For example, frozen beef, grains, nitrates, ores, must continue to move to Europe in large volume, and under the proposed Neutrality Act, no American ship could carry it. Expansion of the north and south trades between the Americas is not possible on any sound, economical basis except to a limited extent. A large part of the existing trade between the South American republics and United Kingdom and Continental Europe therefore cannot be altered. Europe needs the products of South America and will continue to get them in large volumes.

(f) That part of the Neutrality Act referring to shipping indicates a policy of fear and constitutes an abdication of well-recognized rights. It is not a policy of neutrality but one of surrender and defeat. It is unworthy of our tradition and honorable history in maintaining the freedom of the seas.

(g) The Congress has made a declaration of policy with respect to the American merchant marine which has been approved by the American people as follows:

"It is necessary for the national defense and development of its foreign and domestic commerce that the United States shall have a merchant marine (a) sufficient to carry its domestic waterborne commerce and a substantial portion of the waterborne export and import foreign commerce of the United States and to provide shipping service on all routes essential for maintaining the flow of such domestic and foreign waterborne commerce at all times, (b) capable of serving as a naval and military auxiliary in time of war or national emergency."

(h) The proposed Neutrality Act is contrary to this policy as above stated, because:

1. It weakens the national defense.

2. It will defeat the construction of new ships and to that extent weakens our merchant marine policy. It will prevent American-flag companies from carrying out their obligations in this respect to the Government.

3. It prohibits our ships from carrying a large part of our export and import foreign commerce.

4. It excludes American ships from any essential trade routes.

5. It prevents the continuous flow of our domestic and foreign commerce.

6. It discourages the American merchant marine by placing new and additional restrictions upon the operation of American-flag ships which do not rest upon the ships of any other nation.

(i) The expenditure of hundreds of millions annually for the Navy will be largely wasted unless adequate merchant marine auxiliaries can be constructed and made available to supply the Navy. Ships that have been built and are now building, pursuant to the policy of the Merchant Marine Act, would be laid up or their operation circumscribed.

(j) All of the other maritime nations of the world are operating on the high seas today under the well-recognized principles of international law and the return of the United States to this policy would be to the best interest of our national welfare.

This interesting picture, taken by William E. Symons of San Pedro, shows the Los Angeles harbor breakwater during a recent great storm.

1914--OCEAN-GOING TONNAGE--1939

Growth and Development of the Merchant Marine in International Trade

By A. H. HAAG
Director, Division of Research, U. S. Maritime Commission

In comparing the standing of the world's merchant fleets, we must first decide just what types and sizes of ships and the kind of tonnage will be the subject of discussion. Throughout my remarks gross tons only are used and all figures are given in round numbers.

In discussing the total tonnage in the world, we must include ships of all sizes, materials, and types of propulsion. The records show that in 1914 there were nearly 31,000 ships, of about 49,000,000 tons, in the merchant fleets of the world; while in 1939 the total is somewhat over 31,000 ships, of nearly 69,500,000 tons..

However, if we confine our remarks to steam and motor tonnage the picture changes. In 1914 there were approximately 23,000 steam and motorships of about 45,000,000 tons, and in 1939 about 27,500 ships of 68,000,000 tons, as shown in Table I.

	1914 *Number*	1914 *Gross*	1939 *Number*	1939 *Gross*
Vessels 100 gross tons and over all types and materials owned in the world	30,836	49,089,552	31,186	69,439,659
Iron and steel, steam and motor vessels 100 gross tons and over owned in the world	22,925	44,933,878	27,507	68,006,923
Other vessels 100 gross tons and over owned in the world	7,911	4,155,674	3,679	1,432,736

Table I

● Ocean-Going Tonnage

It is generally accepted here and abroad that ocean-going vessels available for transoceanic services are confined to sizes of 2,000 tons and upward, and for the purposes of the comparisons which follow we shall exclude all vessels of less than 2,000 tons.

We must, however, make a further elimination of special types of vessels, such as tankers, cable ships, car and passenger ferries, and training ships, which, though an important part of the merchant marine, will not be considered in the present discussion. It might be of interest, however, to point out that there has been nearly an eightfold increase in the world's tanker fleet during the last twenty-five years. In 1914 it stood at approximately 1,500,000 tons, while today it totals about 11,000,000 tons.

What we are endeavoring to show at this time is the number and tons of vessels, each of 2,000 tons and upward, normally employed in the carriage of goods and passengers in international trade. The standing of the six principal maritime countries in 1914 and 1939 is shown in Table II.

Country	*Number*	*Percentage*	*Gross Tons*	*Percentage*	*Ratio*
In 1914					
British Empire	3,556	65.9	16,258,000	65.4	29.7
Germany	786	14.6	4,107,000	16.5	7.5
France	327	6.0	1,504,000	6.1	2.7
Japan	336	6.2	1,291,000	5.2	2.4
Italy	300	5.6	1,148,000	4.6	2.1
United States	93	1.7	547,000	2.2	1.0
Total	5,398	100.0	24,855,000	100.0	
In 1939 *(January* 1)					
British Empire	2,144	46.6	13,338,000	49.1	6.1
Japan	780	16.9	3,870,000	14.3	1.8
Germany	538	11.7	3,135,000	11.5	1.4
Italy	429	9.3	2,512,000	9.3	1.2
United States	335	7.3	2,178,000	8.0	1.0
France	377	8.2	2,126,000	7.8	1.0
Total	4,603	100.0	27,159,000	100.0	

Table II

It will be noted that the number of ships has decreased since 1914, while the tonnage has become greater, showing, of course, that the size of vessels has increased since 1914. In 1914 we ranked at the foot of the list, with only 93 vessels, of somewhat over a half million tons. In 1939 we find our relative position has slightly improved, for we have advanced from last to fifth place in tonnage. .

● Age and Speed

At this point it is well to emphasize the importance of considering other elements besides numbers and tons of vessels in order to determine the real strength of a merchant fleet. It is only when the numbers, tonnage, speed and age of vessels are all given proper weight that the full competitive power of a merchant marine can be established.

We have made the comparison based on numbers and tons. We now come to the third element — the speeds of vessels of the six principal maritime countries — and we find that the United States ranks last in vessels with speeds of 12 knots and upward.

Let us now bring in the final element—the age of vessels of the countries heretofore mentioned. The records show that in ships of ten years of age or less the United States is in next to last place.

Summing up the case, it will be seen that from the standpoint of competitive power (numbers, tons, speed and age), the merchant marine of the United States operating in the foreign trade is far outranked by all of our principal competitors, as shown in Table III.

● U. S. Merchant Marine

Centering our attention on vessels of ocean-going sizes, we find that there are 1,714 vessels, of 10,220,000 tons, in this category. In the foreign trade fleet there are 326 vessels of these larger sizes, of 2,150,000 tons, of which 44 vessels, of 308,000 tons, are owned by the Government; in the domestic fleet, 493 vessels, of 2,356,000 tons; in the tanker fleet, 365 vessels, of 2,678,000 tons; in the Government-owned inactive fleet, 120 vessels, of 776,000 tons; and on the Great Lakes, 410 vessels, of 2,260,000 tons.

A further breakdown of the American Merchant Marine, iron and steel,

Country	*Number*	*Percentage*	*Gross Tons*	*Percentage*	*Ratio*
Total Tonnage					
British Empire	2,144	30.7	13,338,000	35.5	6.1
Japan	780	11.1	3,870,000	10.3	1.8
Germany	538	7.7	3,135,000	8.3	1.4
Italy	429	6.1	2,512,000	6.7	1.2
United States	335	4.8	2,178,000	5.8	1.0
France	377	5.4	2,126,000	5.6	1.0
Total	4,603	65.8	27,159,000	72.2	
Others	2,390	34.2	10,462,000	27.8	4.8
Total	6,993	100.0	37,621,000	100.0	
Vessels With Speeds of 12 Knots or Over					
British Empire	991	36.4	8,203,000	41.1	7.7
Japan	343	12.6	2,108,000	10.6	2.0
Germany	261	9.6	2,038,000	10.2	1.9
France	177	6.5	1,387,000	6.9	1.3
Italy	156	5.8	1,229,000	6.2	1.2
United States	131	4.8	1,059,000	5.3	1.0
Total	2,069	75.7	16,024,000	80.3	
Others	662	24.3	3,924,000	19.7	3.7
Total	2,721	100.0	19,948,000	100.0	
Vessels 10 Years of Age or Less					
British Empire	671	40.2	4,311,000	43.0	13.5
Japan	247	14.5	1,332,000	13.3	4.2
Germany	140	8.4	869,000	8.7	2.7
France	79	4.7	531,000	5.3	1.7
United States	31	1.9	319,000	3.2	1.0
Italy	22	1.3	226,000	2.2	.7
Total	1,184	71.0	7,588,000	75.7	
Others	483	29.0	2,435,000	24.3	7.6
Total	1,667	100.0	10,023,000	100.0	

Table III

American passenger liner Santa Rosa, one of the four famous Santas of the Grace Line in the New York-South America service.

steam and motor vessels, 2,000 tons and upward, as of September 1, 1939, is shown in Table IV.

Of our foreign-trade fleet of 326 vessels, of 2,250,000 tons, less than half, or 150 vessels, of a million tons, are operating under subsidy contracts.

It will be seen from the table that out of a total of 1,714 vessels, of 10,220,000 tons, 1,528 vessels, of 8,617,000 tons, or 84 per cent, will reach the age of 20 years or more within the next three years.

● Obsolescence?

What is being done about the problem of obsolescence? The answer is that we are off to a good start to correct this condition with respect to the foreign-trade fleet. Orders have been placed for 129 vessels, of more than a million tons, in which the Government and the shipowners are investing about 300 million dollars.

Such of the new vessels as have been completed have demonstrated that they are record-breakers in economical operation. Constructed and equipped to make them the safest vessels afloat, they also have every comfort not only for passengers but for the crew as well. .

S.S. Monterey, one of the two white flyers of the Matson-Oceanic Line services.

● American Seamen

Speaking of the crew, a question often asked is, "How many persons are employed on ships of the American Merchant Marine?" Here again it is necessary to consider what part of the merchant marine is under discussion. If the question is, "How many persons are required to man the documented vessels of the United States?" the answer is 172,000. If we confine the query to the number of men employed on vessels of our foreign trade fleet, the answer is somewhat over 20,000.

With the dislocation of trade and its effect on shipping services in various parts of the world, the question has already been asked as to where the ships now building will be operated when they are ready for service. Let me make this clear: To date no ships have been ordered without at least tentative allocation to the service in which they are to be operated.

			20 *Years Old by* 1942		
	Number of Vessels	*Gross Tons*	*Number of Vessels*	*Gross Tons*	*Percentage*
International Trade					
Privately-owned	282	1,842,000	249	1,519,000	82.5
Government-owned	44	308,000	38	221,000	71.8
Total	326	2,150,000	287	1,740,000	80.9
Domestic Trade	493	2,356,000	461	2,146,000	91.1
Tankers	365	2,678,000	289	2,010,000	75.1
Gov't- owned (Inactive)	120	776,000	120	776,000	100.0
Total, ocean-going	1,304	1,960,000	1,157	6,672,000	83.8
Great Lakes Fleet	410	2,260,000	371	1,945,000	86.1
Grand Total	1,714	10,220,000	1,528	8,617,000	84.3

Table IV

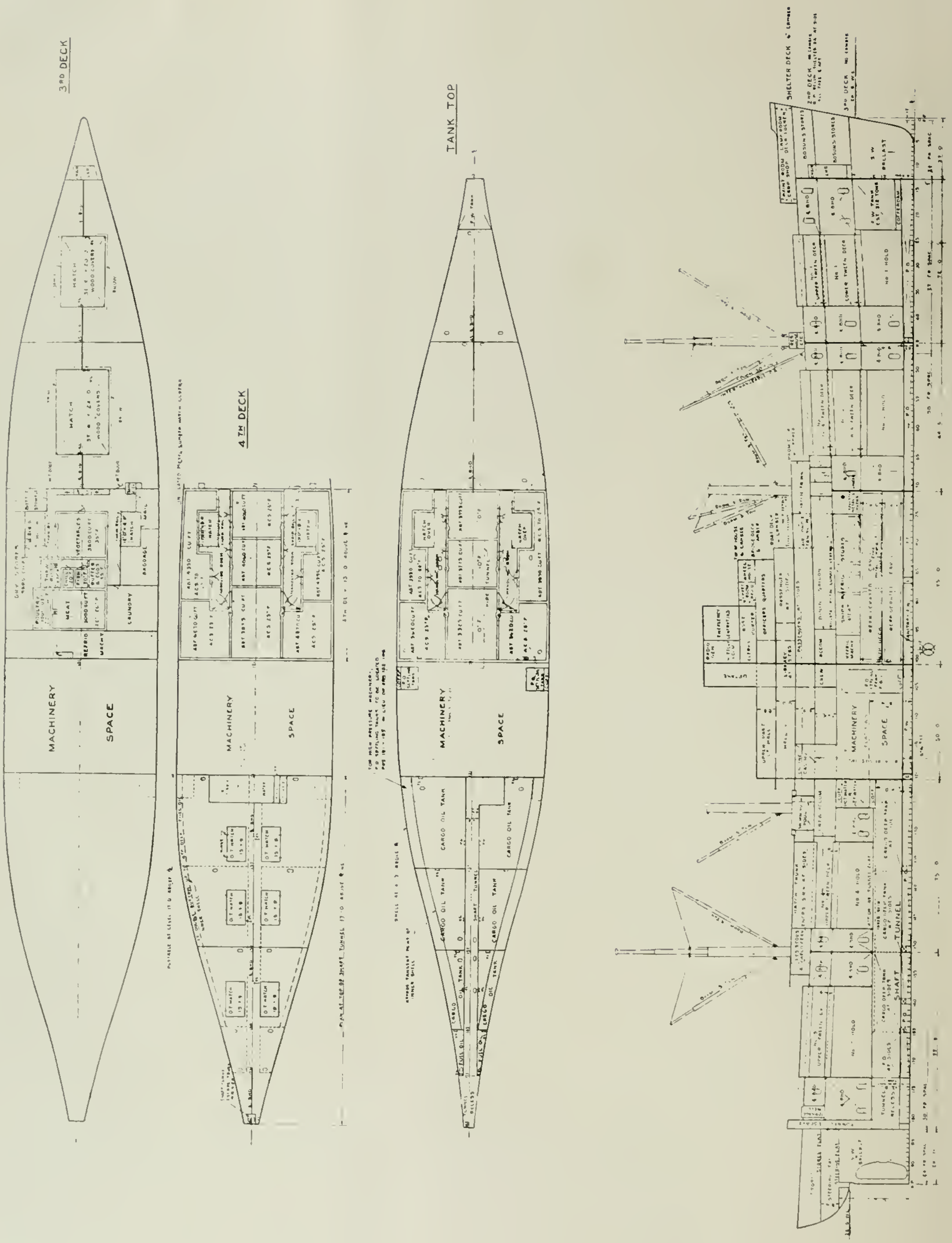
● Replacement Program

This is an opportune time to call attention to the fact that we are not building to increase the size of our foreign-trade fleet—which occupies a very modest position, considering our standing among the great importing and exporting nations—but to replace its many old units in order to provide an efficient competitive commercial fleet, as well as efficient naval and military auxiliaries.

From what has been said, it can be seen that the replacement program adopted by the Maritime Commission —50 ships a year for ten years—is a highly conservative one. The fact is that 500 ships is less than one-third the number that should be replaced before the end of three years.

Chaotic shipping conditions prevailed in this country from 1914 to 1917 because of our failure to support an adequate merchant marine. Since then repeated efforts have been made to recover the strong position we occupied upon the seas during the middle of the last century. To be sure, until recently progress has been slow and costly; nevertheless, we find ourselves today in a much more favorable position to cope with a situation similar to that which confronted us twenty-five years ago.

Abstract of a paper read before the American Merchant Marine Conference, New York, October 10.



Inboard profile and general arrangement plans of cargo spaces of C-3 combination carriers for round-the-world service, American President Lines.

The hulls will be in French gray with blue trim, and the houses in white.

New Ocean Greyhounds Round the World

Seven Sleek, Streamlined Combination Passenger and Cargo Carriers Building at Newport News for American President Lines' Service

Principal Characteristics Compared

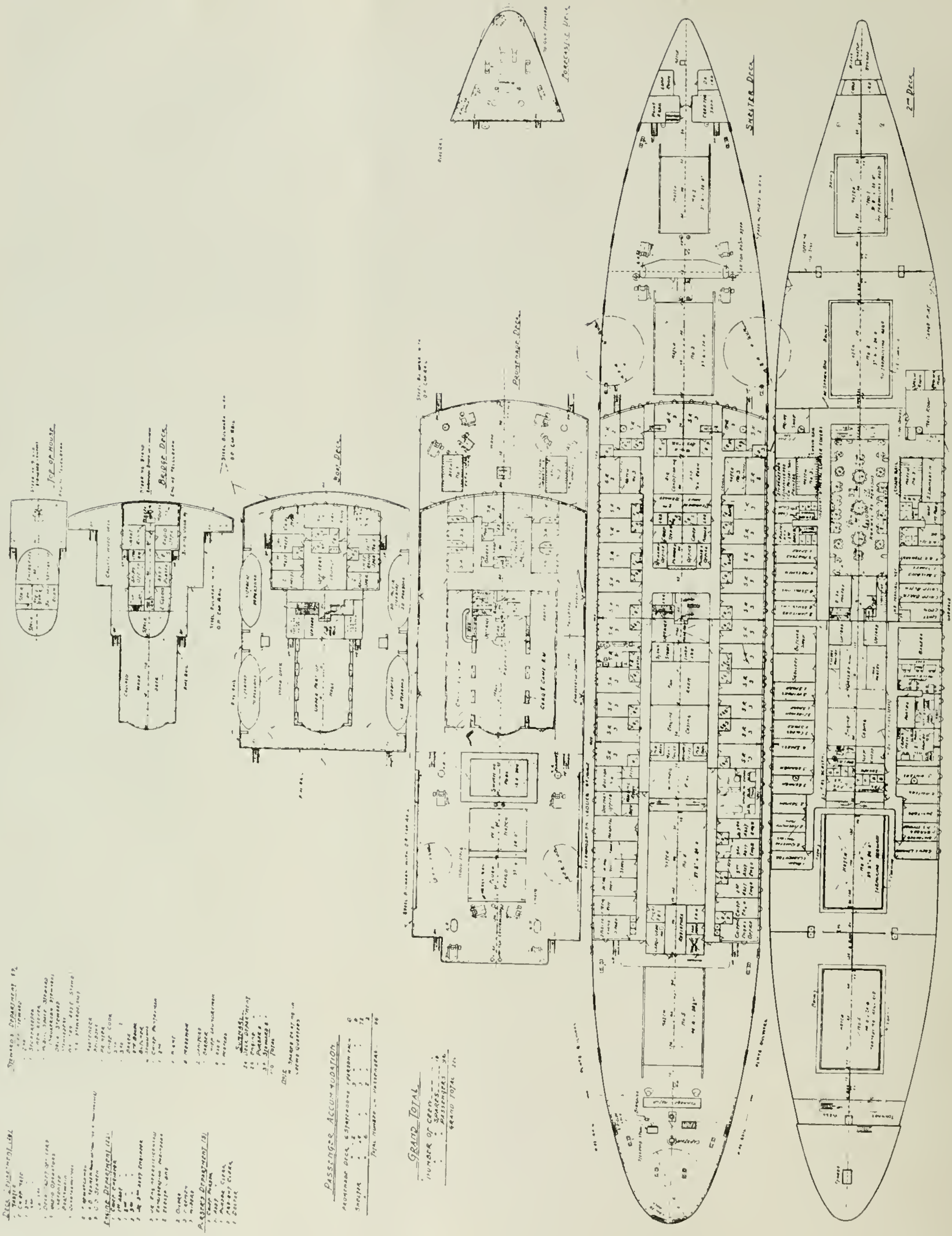
	Present ships	New Ships
Length B. P.	502 feet	465 feet
Beam molded	62 feet	69 feet 6 inches
Depth molded	42 feet	42 feet 6 inches
Draft loaded	31 feet 6 inches	26 feet 6 inches
Propulsion power	7000 S.H.P.	8500 S.H.P.
Sea speed	14 knots	16½ knots
Gross measurement	10,500 tons	8000 tons
Net measurement	6,200 tons	4770 tons

At Newport News Shipbuilding & Dry Dock Company shortly will be laid a keel for the first of seven C-3 type combination passenger and cargo steamers allotted to the American President Lines for their round-the-world service. Much interest in these ships has been evident on the Pacific Coast, and Pacific Marine Review has therefore obtained preliminary drawings and data from the U. S. Maritime Commission and the American President Lines. A wash drawing showing the attractive external appearance of the hulls, together with inboard profile and general arrangement plans, is reproduced herewith.

The new liners will replace seven cargo and passenger steamers built by the New York Shipbuilding Company in 1920, which have been operating continuously in this round-the-world service for 15 years.

Principal characteristics of the old and the new vessels are given in the table reproduced herewith. It will be noted that the new vessels, as compared with the present ships, will be: Shorter; of greater beam; of shallower draft; of greater power and greater speed.

The power plants in these new carriers will be modern steam turbines driving the propeller through double reduction gearing and taking steam at 450 pounds' pressure from modern marine type water tube boilers. In contrast, the present power plants consist of direct-connected, four-cylinder, triple-expansion steam at 225-pound engines taking steam from cylindrical fire-tube Scotch-type marine boilers. These present vessel power plants burn approximately 75 tons of fuel oil per day to drive the ships at 14 knots. The new power plants will burn not more than 58 tons a day to drive the ships at 16½ knots sea speed. The higher speed cuts the schedule from 112 days to 98 days for the round-the-world service, touching at 23 ports, and allows more time in ports.



General arrangement plans of passenger and crew accommodation on C-3 type combination passenger and cargo vessels for American President Lines.

Further particulars for the new ships show:

Light weight of vessel	6,500
Fuel oil capacity	1,455
Potable water	100 tons
Sanitary F. water	460 tons
Distilled water	15 tons
Boiler feedwater	160 tons
Passenger and crew effects	30 tons
Mail, baggage, stores	100 tons
General dry cargo	5430 tons
Reefer cargo	600 tons
Liquid cargo	1350 tons

Total deadweight capacity 9690 tons.

Full load displacement 16,190 tons.

For refrigerated cargo, 60,000 cubic feet will be provided in No. 3 holds, or 100 cubic feet per deadweight ton. Liquid cargoes will be carried in deep tanks in Holds No. 4 and No. 5 The capacities of the dry cargo spaces will be as follows:

No. 1 Hold	91,050 cu. ft.
No. 2 Hold	145,400 cu. ft.
No. 3 Hatch trunks	6,000 cu. ft.
No. 4 Hold	120,800 cu. ft.
No. 5 Hold	90,800 cu. ft.

This provides 81.5 cubic feet for each deadweight ton of weight capacity.

Structural Design

Designed for one-compartment floodability, these ships will be subdivided by seven watertight bulkheads into eight watertight compartments. Forward and after peak bulkheads will be carried watertight to shelter deck, and all intermediate bulkheads to the second deck. This arrangement exceeds in buoyancy and stability the one-compartment standard for a vessel of this size. A tonnage hatch will be fitted in the shelter deck, and tonnage openings in all shelter deck intermediate bulkheads. Double bottoms extend from fore peak bulkhead to within 50 feet of the stern frame.

Accommodations

First class accommodations will be provided for 96 passengers, located as follows: Promenade deck, 6 rooms of 1 passenger each and 2 rooms of 3 passengers each; shelter deck, 6 rooms of 2 pasengers each and 24 rooms of 3 passengers each. Every room has private bath or shower, and toilet. As will be noted on the general arrangement plans, the public rooms are on the promenade deck. This deck has a length of 224 feet, of which the forward 36 feet is open and supports 6 cargo winches and 2 hatches, giving access to refrigerated spaces in Hold No. 3. Aft of this open deck there are 12-foot promenades port and starboard along the sides of the deck house, which is 96 feet long. The forward 50 feet of these promenades is glass enclosed.

Passengers' bedrooms and service rooms occupy the forward end of the deck house; public rooms the aft end. These public rooms are arranged in an open group centering on a large social hall. Eight large ventilating ducts form columns along the sides of this hall and support the sides of the clerestory, which gives the hall a two-deck height for its full size of 24' by 37'. Outside these columns, port and starboard, are spaces 12 feet wide and 54 feet long, in which are installed, on the port side, a cocktail lounge and bar; and on the starboard side, tables for games, and a library.

Just aft of the house is an open-air tiled swimming pool 15 feet by 24 feet. The dining room on these vessels will in one particular be the most modern afloat, in that, like the most modern office buildings ashore, it will depend entirely on air conditioning, artificial ventilation and electrical illumination. It has no access to outside air or to sunlight.

Located on the second deck, just forward of the galley, this dining room is 24 feet wide and 54 feet long, and will normally serve 92 persons at one sitting.

Ample space is provided in bedrooms. Each 3-passenger room on the shelter deck is 10 feet x 19 feet. Each of these rooms is against the outside skin of the ship and has two large portholes. In addition, ample mechanical ventilation is provided Each room has 2 wardrobe lockers, a dresser, 2 tables, 3 chairs, 2 beds and a Pullman berth.

Crew's Accommodation

The normal crew complement is 110 men, made up as follows: Deck department, 26; engine department, 22; steward's department, 57; purser's department, 5. With the exception of the captain, 4 mates, 3 radio operators, 2 clerks and the assistant purser, who are on the boat deck and the bridge, all of the crew are housed amidships on the shelter and second decks. Officers' mess and lounge is on shelter deck; crew's mess and lounge on the second deck.

In the majority of the rooms for crew there are 3 men allocated; in many rooms only 2; and the maximum allocation is 4.

Propulsion Power Plant

The vessel will be propelled by cross-compound turbines driving the propeller shaft through reduction gears at approximately 85 revolutions per minute. The turbines will develop normally 8,500 shaft horsepower, but when required will be capable of developing continuously 10 per cent in excess of this.

Steam will be generated by two water tube, air encased boilers at 450 lbs. per sq. inch and 750° F. total temperature, and delivered to the turbines at 440 lbs. per sq. inch and 740° F. total temperature. The boilers will have variable superheat control, and desuperheaters will supply the auxiliary steam system.

Two 300-K.W. turbo-generators will provide power for a 120/240 D.C. three-wire system for the ship's electrical supply, and will also furnish power for the auxiliaries, most of which are motor-driven, thus obtaining high efficiencies. Sufficient of the important pumps have been retained with steam drives to provide flexibility of operation .

The overall fuel consumption under normal operating conditions, when the machinery is developing 8,500 shaft horsepower with the connected load of the generator and heating system, will be 0.60 lbs. of fuel per shaft horsepower per hour.

Turbines

There will be one high-pressure turbine and one low-pressure turbine, both of the impulse or impulse-reaction type. The turbines will be provided with suitably cross-connected piping, which will permit either unit to be operated independently, for emergency power. An astern element of the impulse type will be located in the low-pressure casing, and will be capable of producing 40 per cent of the ahead power with 50 per cent of the ahead revolutions, and 100 per cent of the normal ahead steam flow.

Fine Steel Hull
U. S. Coast and
Launched at

Explorer takes to the water.
Insert: Mrs. L. O. Colbert, sponsor.

By
C. F. A. MANN

Sponsored by Mrs. L. O. Colbert, wife of Admiral L. O. Colbert, director of the U. S. Coast & Geodetic Survey Service, the handsome, modernistic-looking 220-foot Survey ship Explorer slid down the ways at the Lake Washington Shipyards, Houghton, Wash., on October 14.

The Explorer, a million-dollar addition to the fleet of Geodetic Survey ships, is designed expressly for charting the vast Northwest and Alaska coast, and is built to assure comfort on long voyages away from her shore base in the worst Western Alaska (Aleutian Island) weather. She carries a most elaborate survey gear and has the highest class of accommodation for a crew complement and survey engineers of nearly 90 persons. She will be the finest marine survey ship owned by any nation. In outward appearance, she is strikingly modernistic and yet severely plain in lines. The buff and white exterior trim and rakish funnel gives her the appearance of a private yacht instead of a heavy-duty workboat.

W. C. Nickum & Sons, Seattle, are responsible for all detail plans. Comdr. A. M. Soberalski is in charge of the construction for the Survey Service.

Principal dimensions are as follows:

Length O. A.	220 ft. 8 ins.
Beam	38 ft.
Depth	23 ft. 2 ins.
Loaded draft	15 ft. 2 ins.
Displacement tons	1,500 light 1,800 loaded

Explorer is of completely fireproof construction and of the two-compartment standard of hull subdivision—two complete compartments can be flooded without danger of sinking. She has 8 transverse bulkheads, dividing her into 9 watertight compartments. Only three of the bulkhead walls are pierced by doors, and these are of the latest type automatic design, with bridge controls for emergency closing. The shell plating is seam riveted, and 90 per cent of the balance of the hull joints are welded. All outer plating is welded at the butt joints. A ½-inch belt extending 6 feet on the sides at the waterline has been welded to the hull for protection against damage by rocks and ice.

She has double the subdivision of hull required of ships of this class, and all bulkheads extend to the main deck. The double bottom in way of the machinery space extends up the bilges and sides to the level of the lower deck, forming tanks with capacities for 325 tons of fuel oil, 99 tons of feed water and 75 tons of potable water. At cruising speed of 12 knots she has sufficient bunker space for 6,000 or 7,000 miles cruising range. Her turbine power gives her a maximum speed of 14½ knots.

Two 3,000-lb. anchors and 120 fathoms of ⅞" stud link chain are carried forward in the chain locker. A Markey steam windlass is carried under the deck, with power extension to operate a capstan on the weather deck.

The large refrigerated food stores are heavily insulated with mineral wool, and are face-lined inside with Monel Metal, a novel application of this versatile material. A large York steam drive, direct expansion ammonia system supplies refrigeration for this space through coils in the chill-room space and cold air circulation in the main storage space.

Next aft of the reefer stores is the engineer's storeroom and a complete carpenter shop equipped with latest saws, planers, borers, sanders and other tools for construction and repair work on shore camp buildings and boats. Aft of the machinery space are located: the gasoline and diesel oil storage space, with two 1,500-gallon tanks; a gasoline pumping room; and a powder magazine for depth charges used in deep sounding work.

The stern frame carries an Oertz streamlined rudder, controlled by a Markey steam steering gear. A special Navy design Doran bronze propeller is fitted. Lignum vitae stern bearings are used.

Accommodations

On the main deck, forward, is the crew's forecastle, with space for 24

For Million-Dollar Geodetic Survey Boat Lake Washington Yard

berths and ample provision of showers and lockers. All lockers, trim and doors are of steel. Quarters for 12 petty officers, followed by quarters for 8 chief petty officers, a 4-bed hospital and a laundry, occupy the balance of this deck forward of the engine room. Aft of the machinery space, on the main deck, are quarters for 12 officers, 10 senior officers, and a large lounge.

In the deckhouse is a large galley, with an oil burning Buell range, steam cooker, electric mixers and large work space, all finished with Monel Metal trim. Aft of this is a ward room, a pantry and a large plotting room for the surveyors. Atop the deck house is a large space for the captain, including a ship's office, pantry, bath and service rooms.

Accommodations for a total of 87 men are provided, including Survey engineers. Ample facilities are installed to "plant" shore parties and service them during long observation periods.

The Explorer carries four 30-foot survey launches, two 24-foot whaleboats and two 16-foot dinghies. The Markey windlass set-up handles these auxiliary vessels overboard through wire rope falls and fair leaders. The survey ships, built by the Navy, have 100-H.P. Buda diesel engines for power. The rest of the boats are oar-propelled.

Machinery

Steam power is generated in two Babcock & Wilcox 350-lb. pressure water tube boilers of latest marine type, operating on oil fuel with a Sturtevant induced draft system. The boilers are equipped with Diamond soot blowers; Bethlehem oil and water separators are installed. The main turbine is a De Laval double reduction geared unit driving the propeller at 130 r.p.m. General pumping requirements are handled by Warren steam driven oil transfer, fuel oil service, bilge and two fresh water pumps.

Two Paracoil fuel oil heaters, a Paracoil distiller and evaporator and heater tank for ship's hot water were supplied by Davis Engineering Corporation. Other auxiliary machinery and equipment includes: a Brown $C.O._2$ indicator and stack pyrometer; Wager smoke indicator; Worthington air compressor; Condenser Service Co. main condenser, with Monel tubing; Warren centrifugal circulating pump, driven by an Elliott turbine; Condenser Service Co. air ejector; two Warren electric condensate pumps; Condenser Service Co. auxiliary condenser with Worthington auxiliary circulating pumps.

Explorer just after launching, afloat on Lake Washington.

Two 50-K.W. Westinghouse 115-volt D.C. generators furnish auxiliary power for the ship, each being driven by a turbine of Westinghouse manufacture. A Westinghouse switchboard is fitted, and a special 5-K.W. generator for operation of the Fathometer equipment is installed. A 10-K.W. emergency generating set driven by a Superior diesel automatically picks up the necessary light and service circuits in case of any failure in the main generating sets.

A 25-K.W. Westinghouse A.C. to D.C. converter set is installed for use during layups or shore stops where A.C. current is available.

Fire Protection

Furniture, lockers, berths, doors, are all fireproof metal construction, doors being insulated with mineral wool. Flooring is a new patented rubber compound by Armstrong Cork & Tile (Linoleum), which is spread on in paste form and guaranteed for ten years. Paneling is of Asbestos Flexboard type, by Johns-Manville. A Walter Kidde C.O.$_2$ fire system, with six bottles in boiler room and a special six-bottle system connected to the smoke detection and fire extinguishing system, and a Kidde electric fire detection system, are fitted. Heating throughout all quarters is by air, circulated by nine Ilg blowers and heated by finned tube coils, using 50-lb. steam pressure, and automatically regulated by thermostats.

Kearfott metal windows and Kearfott stainless steel doors are to be fitted. The welded steel tubular mast will carry two 1-ton cargo booms.

Survey-Navigation Equipment

Practically every device known to modern navigation and marine survey work will be installed on this ship. Included are: a large Sperry Metal Mike, RCA radio direction finder; Sperry repeating compasses on bridge wings and emergency steering station; course recorder; three Sperry searchlights on pilot house, one on the mast, and one on the aft upper deck; Sperry rudder angle indicator; r.p.m. indicator in pilot house; a Walker Trident electric taffrail indicator; a Meridian submerged log with electric indicator in pilot house; a high and low frequency RCA radio set and an RCA radiophone receiving and transmission set; a 12-station American intercommunicating telephone; a 3-station Remler emergency loud speaker system; two Fathometers; a Hughes special depth recorder; two special sounding machines of unannounced makes; a Clark Cooper & Son whistle with Henschel automatic time device for code signaling; and a Cory clear vision screen.

Electric Motor of Tomorrow

A demonstration of the superiority of glass fiber as insulation for electric motors is attracting much attention at the New York World's Fair. Sponsored by Owens-Corning Fiberglas Corporation, the exhibit is called, "The Electric Motor of Tomorrow," and is on display at the Glass Center building.

A completely Fiberglas-insulated motor in a standard five-horsepower frame size is shown in the exhibit, delivering, consistently, the same power as a standard cotton-wound ten-horsepower motor opposite.

The exhibit demonstrates that Fiberglas insulation permits a substantial reduction in size and weight of motors. It also demonstrates that motors with such insulation may be operated at higher temperatures than motors with other types of insulation.

The exhibit offers evidence that the rating of many motors using Class A insulation could be increased from 50 to 100 per cent with the aid of glass insulation.

The two motors in the exhibit are hooked up to a dynamometer through a coupling, and the load may readily be alternated between one and the other. The gages show that the small motor, which is some 160 pounds lighter in weight and 45 per cent smaller in volume, will develop the same power as the larger standard motor, and, at the same time, possesses the same or a superior amount of stamina.

The smaller motor weighs 190 pounds, as compared to a weight of 354 pounds for the larger. Both are 3-phase, 60-cycle, squirrel cage induction, 220/440 volts at 1730 r.p.m. The frame size of the Fiberglas motor is No. 254—standard for a five-horsepower motor—and the frame size of the larger motor is No. 324—standard for a ten-horsepower motor.

● Greater Temperature Rise In New Motor

There is a marked difference in the temperature rise between the standard motor and the Fiberglas-insulated motor at full load. This temperature rise at full load is 55° Centigrade in the standard motor, whereas the smaller Fiberglas-insulated motor permits temperature rise to 100° Centigrade at full load.

Because the commonly used types or organic insulation—such as cotton, silk and paper—rarely permit a rated temperature rise greater than 55° Centigrade, it is obvious that the insulation of the standard motor would soon burn out if the motor were run at the higher temperature of the smaller motor.

"The Motor of Tomorrow" has its stator coils wound with glass-insulated magnet wire and taped with Fiberglas tape. The stator slots are lined with an insulation made of a combination of mica splittings and Fiberglas cloth bonded together. The slot wedges are made of a molded product consisting of a laminated Fiberglas cloth and a bonding medium. Lead wires are protected with Fiberglas braided sleevings and tied down with Fiberglas tying cord.

● Moisture Resistance Problem Solved

The use of Fiberglas as insulation in motors has also helped to solve the problem of moisture absorption. In fact, glass is the first practical totally inorganic textile—one whose characteristics permit it to be used on standard textile mahinery. In the laboratory and in operation, these characteristics have proved it to be, in most cases, superior in many ways to other fibrous materials used for electrical insulation.

Fiberglas insulation is being specified for a wide variety of jobs, ranging in size from fractional-horsepower motors to the largest of generators, such as will be used in the Grand Coulee Dam.

REFRIGERATION LOADS—
Pacific Coast Tuna Clippers

By D. W. DICKIE, N. A.

There are very few of the brine tuna clippers that have not had the original refrigeration plant increased after undergoing a thorough tryout in actual service. Part of the error arose out of the former belief that a temperature of 28 to 30 degrees was low enough to keep the fish in satisfactory condition, and later, when the standard carrying temperatures were adopted, all of the heat loss factors were not included in the calculations.

In the August Pacific Marine Review article the correct temperatures of fish and sea water were given, and 86 degree sea water has now been accepted as a basis to work from.

The worst condition is the one where, say, four wells are stowed with fish at zero, two wells are stowed with fish at 86°, and a well from which bait has been used has been cleaned ready for the next catch. All of the zero brine or brine and ice crystals has been used from the storage well.

Before any more fish can be stowed it is necessary to:

(1) Cool the two stowed 86 degree wells down to zero;

(2) Hold the other four wells at zero against heat leakage;

(3) Be ready to start freezing a fresh well when it is stowed with fish.

The fishing is done in the daytime, which allows 12 hours at night to get the freezing process under way.

Assume the boat stows 16 tons (32000 pounds) of fish and 4 tons (8000 pounds) of brine in a well, and that there is sufficient cooled sea water or brine to put into the well with the fish to start cooling the cargo.

Taking the items in order:

Item 1

There are apparently no data available regarding tuna in the natural state, but mackerel and tuna belong to the same family. Bulletin 28 of the Department of Agriculture gives for:

Mackerel (edible portion only): Water 64% to 78.7%; protein 17.5% to 19.5%; fat 2.2% to 16.3%; ash 1.0 to 1.5%.

Tuna (edible portion only): Water 72.7%; protein 21.7%; fat 4.1%; ash 1.7%.

When the entrails are included the water content is about 75% of the whole fish, and the tuna are stowed as they are caught without cleaning. Complete calculations show the heat load under Item 1 to be as enumerated in Table 1.

Cool 32,000 pounds of fish 86° to 32°	1,416,960 B.T.U.[1]
Latent heat, 32,000 pounds of fish	3,488,000 B.T.U.
Cool 32,000 pounds of fish 32° to 0°	419,840 B.T.U.
Cool 8000 pounds of wet wood 86° to 0°	495,360 B.T.U.
Heat coming through the walls 24 hours	154,800 B.T.U.
Total British Thermal Units, 1 well	5,974,960

Table I

The August Pacific Marine Review article is based on cooling the storage well with 40% ice content, which is greater than the cooling of a well with fish in it when the popular figures are used, but cooling a well with fish in it is greater when the above figures for the heat are used.

All ship refrigeration storage rules call for the reefer boxes to be cooled at low temperature for 24 to 48 hours before cargo is stowed in them, to get rid of the heat of the walls. The fish boats are not fitted up to do this, so the heat of the walls of the well has to be included in the heat load, and where bait has been in the well the walls are at a temperature of 86 degrees throughout the entire thickness.

Where a well holds 16 tons of fish and 4 tons of brine, or 20 tons total, the cubic capacity of the well is 20 tons x 31.25 cubic feet per ton=625 cubic feet. By laying off the approximate shape of the well as it is in the boat the surface can be calculated. In the case of the boat of the August article the wall surface of the long shallow after well was of greater area than the cubical midship well holding the same amount.

By laying out the various types of construction of the wells in the wood tuna boats and plotting the temperature curves through the walls, it was discovered that a good approximation was obtained by assuming a thickness of 4" to 4½", regardless of the actual thickness of the bulkheads or the side of the boat, and assuming that this entire thickness had to be cooled from 86 degrees down to zero.[2]

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[1] The secific heat of the fish is calculated on the basis of 75% water content. Water above freezing has a specific heat of 1.0, so 75% water = .75, to which must be added .07 for the remainder, and we get .82 as the specific heat of the fish in B.T.U. per pound for temperatures above freezing. The heat of fusion of ice is 144 B.T.U. per pound x 75%, which is 108, to which we add for the other elements of the remainder and get 109 B.T.U. per pound of the fish for the freezing point. Ice below freezing has .504 specific heat. So 75% = .38 + .03 for the remainder = .41 specific heat of the whole fish below freezing. These remainder figures were taken from a large number of authorities, and indicate that the remainder adds about 9% to 10% to the water figure.

[2] 508 square feet x 4.5" thick x 3.5 pounds per inch thickness = 8000 pounds of wet wood. 8000 pounds of wet wood x 86 degrees difference (86° to 0°) x .72 specific heat = 495,360 B.T.U. = the cooling load of the walls of the well of the boat.

Cool 17,000 pounds of sea water 86° to 28°	986,000 B.T.U.
Cool 8000 pounds of wet wood 33 degrees × .72 specific heat	190,080 B.T.U.
Heat coming through the walls 24 hours, 300 sq. ft. × .3 conductivity × 50° × 24 hours	125,280 B.T.U.
Heat load in B.T.U. for 24 hours	1,301,360 B.T.U.

Table II

In the case of the heat coming through the walls the same idea was carried out and a conductivity figure of .3 was arrived at, which eliminated the necessity of taking account of the thickness of the walls of the well.

The heat coming through the walls would be 500 square feet x 24 hours x .3 conductivity x $\frac{86^\circ}{2}$ mean temperature difference = 154,800 British Thermal Units.

Item 2

The load for holding the stowed wells can be taken from the last line of Item 1 multiplied by the number of wells under control. Heat coming through the walls of one well 154,800 B.T.U.

Item 3

To be ready to start freezing for the next well to be stowed with fish, the Brine Strengthening Tank is used.

The capacity of the brine strengthening tank is 8.5 short tons (about 17,000 pounds of sea water or 19,300 pounds of 22% brine), sufficient to furnish brine for leaching in case the catch of fish amounts to 32 tons, or enough fish to stow two wells. The tank has the tropical sun shining on 3 sides, a bait tank on one side, a cold room on one side and a comparatively cool space below, so an approximate average for the temperature differences was used in connection with the actual weight of the wood in the tank.

As sea water freezes at 27.5 degrees, the cooling load in B.T.U. reducing sea water from 86 degrees to 28 degrees is as shown in Table 2.

The cooling load where 22% brine is used is divided into two steps, 86° to 32°, and 32° to 0°, so advantage can be taken of the greater efficiency of the compressors working at high back pressure. One batch has to be cooled to take care of the leaching brine and three batches have to be cooled to renew the brine in the storage well. The loads for each batch using this method are shown in Table 3.

There are three methods of holding the cooled cargo against the heat coming through the walls:

(1) Have the wells fitted with independent cooling coils;

(2) Circulate the brine in the wells over the high velocity coils used for cooling to remove the heat;

(3) Where the vessel is fitted with Pak-Ice machines to depend on the melting ice in the cooled wells to partially take up the heat while the other wells are being cooled by the machine.

Cooling load in B.T.U. using 22% brine 86° to 32°	
Cool 19,300 pounds of 22% brine 86° to 32° 19,300 lbs. × 54 degrees × .8 spec. heat	833,760 B.T.U.
Cool 8,000 pounds of wet wood × 32° mean temperature difference × .72 spec. heat	184,320 B.T.U.
Heat coming through the walls 24 hours 300 sq. ft. × 54 degrees × 24 hours × .3 conductivity	116,640 B.T.U.
Load in British Thermal Units, one batch	1,134,720
Cooling load in B.T.U. using 22% brine 32° to 0°	
Cool 19,300 pounds of 22% brine 32° to 0° 19,300 lbs. × 32 degrees × .8 spec. heat	494,080 B.T.U.
Cool 8,000 pounds of wet wood × 15° mean temperature difference × .72 spec. heat	86,400 B.T.U.
Heat coming through the walls 24 hours 300 sq. ft. × 32 degrees × 24 hours × .3 conductivity	69,120 B.T.U.
Load in British Thermal Units, one batch	649,600

Table III

Part A	Cool 32,000 pounds of fish 86° to 32°	1,416,960 B.T.U.
	Plus 26.6% of lines 4 and 5	173,000 B.T.U.
	26.6% of the load in B.T.U.	1,589,960
Part B	Latent heat 32,000 pounds of fish	3,488,000 B.T.U.
	Plus 65.5% of lines 4 and 5	426,000 B.T.U.
	65.5% of the load in B.T.U.	3,914,000
Part C	Cool 32,000 pounds of fish 32° to 0°	419,840 B.T.U.
	Plus 7.9% of lines 4 and 5	51,160 B.T.U.
	7.9% of the load in B.T.U.	471,000

Table 4

There are two methods of cooling the wells:

(1) Put the sea water to be used for leaching into the well at 28 degrees, toss in the fish and circulate the sea water over high velocity coils until the cargo is brought down to 32°. Then discard the leaching water overboard with the blood and gurry, put the 22° brine in the well and bring the fish cargo down from 32 degrees to zero.

(2) Put the sea water used for leaching into the well at 28 degrees, toss in the fish, and when the fish

cargo is stowed pump the leaching water with the blood and gurry overboard without attempting to remove any heat. Then put the 22° brine into the well and bring the fish cargo down from 86 degrees to zero.

In the first case, blood and gurry discolor the flesh of the fish if they are left in the leaching water too long; and in the second case a reduction in grade of the fish results from holding them at high temperature while stowing them in the well and changing from leaching water to brine before starting the cooling process. A compromise between the two methods would shorten the time of the former and get rid of the initial excess heat in the latter, both beneficial to the process.

A characteristic of ammonia compressors is that where a condensing pressure of 185 pounds is established a substantial increase of refrigeration capacity is obtained by raising the suction pressure. Consequently it is best to divide the work into three steps:

Cool two wells 86° to 32°	3,179,920	B.T.U.	
Cool 3 batches in brine tank	3,404,160	B.T.U.	6,584,080
Remove the latent heat, two wells			7,828,000
Cool 3 batches in brine tank, 32° to 0°	1,948,800	B.T.U.	
Cool two wells 32° to 0°	942,000	B.T.U.	
Hold 4 wells	619,200	B.T.U.	3,510,000
Total cooling load in British Thermal Units			17,922,080

Table 5

(A) Remove the heat to bring the temperature of the fish and the three batches of the brine tank from 86 degrees down to 32 degrees;

(B) Remove the latent heat of the fish;

(C) Remove the heat of the fish from 32 degrees to zero, the heat of the brine tank from 32 degrees to zero, and remove the heat coming through the walls of the well.

If we assume the capacity of the compressor to be 100% in the 3d case, it will work at about 173% in the second case and about 232% in the first case.

Unfortunately the gain in capacity by raising the back pressure is not as large as it looks at first glance. If we divide the work under Item 1 into three parts, we get loads as in Table 4.

We find that when the compressor is working at the assumed 232% capacity it only has 26.6% of the heat load to extract. At 173% of capacity it has 65.5% of the heat load, and at 100% it has 7.9% of the heat load to extract.

Correlating the entire load into parts A, B and C, we finally get loads as in Table 5.

International Fisheries Law

Its Application to Alaskan Fishing Waters

By A. J. EARLY

President Port Commission, Seattle, Washington

The problem of protecting the rights of the United States in Pacific Ocean fisheries is a matter of grave importance to all American citizens, involving the preservation of a large food supply and of hundreds of millions of dollars in payrolls. The problem has been made acute in recent years by costly and continued raids of foreign-flag fishing boats along the North Alaska rim and in the Bering Sea area.

This problem chiefly relates to salmon, not only one of our most important sources of protein food but one of the most valuable Pacific Coast industries. The salmon pack in recent years has reached an annual value approximating $97,000,000. Japanese invasion of American fisheries in recent years has taken an immense amount of American-propagated salmon from fishing grounds that were technically and lawfully American.

Now this problem is not only commercial. It has political repercussions that may make it a threat to the peace of the nations bordering the Pacific.

During the Congressional debate over the so-called Neutrality Bill in 1937 (the bill which is now under fire in Congress), Senator Lewis B. Schwallenbach brought the Pacific Ocean fisheries problem before the Senate in a very lucid manner. Said he:

" . . . We have been discussing legislation involving international relationships, particularly in the so-called neutrality legislation. It has been our objective to prevent, if possible, American involvement in foreign controversies. To avoid such involvement, the Senate has mandated the voluntary relinquishment of many rights, the protection of which in the past has been viewed as properly essential. I may say it is the unanimous opinion of all who are fully familiar with the problem of the threatened invasion of American fisheries that this problem contains potentialities which may more seriously threaten the peace of the United States than any other on the immediate horizon.

" . . . The problem is dangerous to our international relationships only if it is permitted to continue to be submerged and if the feelings that are now being engendered over it are permitted to smoulder through lack of general understanding.

"... It involves the future of the fishing industry in the States of California, Oregon, Washington, the Province of British Columbia, and the Territory of Alaska. It involves an outstanding wholesome food supply besides the employment of thousands of our people."

The senator then cited figures to show that: The various Governmental and private agencies involved have spent an annual average of $1,610,127 for the 10 years ending January 1, 1937, to conserve these fisheries; the value of the manufactured and canned products of these fisheries in a typical year was $97,159,000; that these fisheries gave work to 76,926 persons; and that the number of vessels and boats engaged in this business was 20,914.

In July, 1937, according to Senator Schwallenbach, there appeared off the Alaska coast fleets of fishing boats of the mother ship floating cannery type, carrying nets two miles long and operating outside the three-mile limit.

To understand this threat to American fisheries one must know the habits of the salmon. This fish spawns in certain sections of fresh water streams or lakes. After the laying of eggs and fertilizing thereof the adult fish dies. The young fry gradually make their way down to the sea, and return after about four years unerringly to the place where they were born, there in turn to spawn and die. Alaska is peculiarly suited to this type of life cycle. Over 80 per cent of our salmon supply comes from that territory.

All American fishing in Alaska has for years been carefully regulated by the Federal authorities, so that there is sufficient escapement of salmon to adequately stock the streams. The salmon are all caught at sea within 20 miles of the coast.

The Japanese fishermen working for floating canneries have no restrictions. With their big nets they work 24 hours a day and take out of the runs all the salmon they can haul. In the Japanese fishing concept there is no such idea as escapement. Their methods have about destroyed the Russian salmon runs on the coast of Sibeira. They now propose to destroy the American salmon runs on the coast of Alaska. On strong protest from our State Department these raids have been discontinued, but the consensus seems to indicate that they will be resumed as soon as conditions in Japan and lack of watchfulness in the United States make the raiding less dangerous to the balance of international politics.

These fish were born in our waters; we spend taxpayers' money conserving them; we should not allow foreign poachers to destroy them.

During the past century, somewhat similar situations and disputes have arisen between the United States and Great Britain, Canada, Holland and other foreign governments, in relation to salmon, halibut, herring and other fish, and the territorial rights or principles of conservation involved.

These disputes have been invariably settled on the basis of right and justice or natural or obvious preference of ownership, of rights, but also on the basis of principles of conservation of the resource.

In 1938 two bills were introduced in Congress to prohibit this poaching, and comprehensive hearings were held before the Committee on Merchant Marine and Fisheries. Neither bill was passed, but they were useful in serving notice on invader interests and in awakening the people of the United States to this danger.

This and other recent disputes involving jurisdiction over coastal waters show that the three-mile limit is an out-moded technicality.

Abstract of paper read before the Twenty-sixth Annual Convention of the Pacific Coast Association of Port Authorities, Oakland, August 23, 1939.

Comment On the Above Paper

By JOSEPH WALTER BINGHAM

Professor of Law, Stanford University

A few years ago, about the time that we woke up to the menace of foreign invasion of our Alaska salmon fisheries, Japan sent a business delegation to the United States. It arranged a meeting with representatives of Pacific Coast fishing interests. At this meeting the Japanese blandly suggested that they were the world's master fishers; that by right, therefore, they should do the world's fishing; that their overhead costs and labor costs were much lower than those of Americans or Europeans; that if they were given a monopoly of exploitation of the Alaskan fisheries under an organization backed by Japanese, Canadian, and American capital, the profits for all would be great. Of course, they added, Japanese could fish outside territorial waters, regardless of American - Canadian conservation measures, and catch all the salmon they wished as the fish returned to their native streams to spawn, but it would be better to have a friendly cooperative arrangement. Coincidently, the Japanese Government announced that it was sending a scientific expedition on a Government vessel to Alaskan waters on a three-year mission to determine the value of the fisheries for exploitation.

Immediately a storm of opposition to Japanese encroachment on our salmon fisheries broke and initiated a vigorous campaign which now promises to result in adequate legal protection for all our coastal fisheries. The Japanese are pursuing the same tactics all along the Pacific coasts of the Americas wherever there are valuable fisheries. Already they have obtained concessions from Mexico, and have attempted to get treaty rights from

Peru. They have rights also under an agreement with Argentina and are reported to be negotiating concerning the fisheries off the Atlantic coasts of Mexico. They also have invaded the coastal fisheries of Australia, the Philippines and the Dutch East Indies, and they fish off the coasts of China and Siberia.

At present our legal situation is as follows:

(1) Our Government has arranged (early in 1938) an informal agreement with Japan that Japan will not license Japanese boats to fish for salmon in Alaskan waters. They are permitted to fish for crab, and the Japanese Government refuses to admit that Japanese vessels had been fishing for salmon in these waters (since Japan had not licensed them to do so) in spite of cogent evidence presented that such fishing had occurred previous to the agreement. This is a temporary arrangement and implies no consession by Japan of right of our Government to control fishing at sea outside the three-mile limit. Obviously, Japan could not afford a serious controversy with the United States while carrying on hostilities in China under all the collateral international difficulties of these troublous times. When her hands are free, Japan will return to prosecute her invasions of our fisheries.

(2) Under our existing law, our Government could do nothing to stop destructive foreign invasions of our coastal fisheries outside the three-mile limit except to request the Government whose flag the invading vessel flies to prevent the invasion as a matter of comity. But comity alone without collateral reasons of major importance to the foreign state would not stop the invasions as long as our Government adheres to the three-mile doctrine.

(3) Unfortunately, for over one hundred years, the United States has been one of the leading propagandists for the three-mile doctrine of territorial waters as a rule of international law. Great Britain, Germany and Japan have been the other principal promoters of the doctrine. One of the strong motives back of the doctrine has been that it supports free fishing on foreign coasts against the objection of the coastal state. The doctrine, in brief, limits territorial coastal waters to a strip three miles wide, measured from low water mark, with the addition of certain bays and similar coastal indentions, which are subject to special rules. Bristol Bay probably could not be claimed as territorial waters under these rules; and even if it could, the Japanese could intercept the salmon run outside Bristol Bay. The strict Anglo-American doctrine confined the control of the Coastal State over its sea fisheries to territorial waters so limited. Thus, by our own diplomatic record, which has been made chiefly in pursuance of our claims throughout the nineteenth century against Great Britain to fish off British Atlantic North American Coasts, we blindly have given Japan a strong argument for insisting that its fishermen have a legal right to invade our coastal fisheries outside the three-mile limit. Japan can cite our own propaganda against us.

However, the three-mile doctrine is not settled international law. Especially as to coastal fishery control, it always has been opposed by a majority of the coastal states, including Russia, Italy, Spain, Portugal, Norway, Sweden and all the states of Latin America, which have valuable fisheries off their coasts. The doctrine is essentially Anglo-American propaganda. If it were abandoned by Britain and the United States it would collapse. There is no sufficient reason why the United States, at any rate, should not abandon it as to coastal fisheries, and thus do away with an insurmountable legal embarrassment in opposing Japanese invasions of our fisheries. If this were done, then Congress should pass legislation providing for policing our fisheries against foreign encroachments as far out to sea as necessary for their protection.

Beachcomber's Loot

We found these where they lay,
On beach, or deck, or hold,
Or in some sea wight's book--
Tales to be simply told.

One of our beachcombing craft off the coast of Sumatra.

Getting Something for Nothing at Sea

In these New Deal days, when we are all seemingly trying to lift ourselves by our bootstraps, borrow ourselves rich, or spend without earning, it is sometimes good to know that this sort of thing has been quite prevalent for many generations. The great difference is that today we are going at this business in more wholesale fashion—making dictators out of our greatest "Open Sesame" exponents, and ideologies out of our most crack-brained theories.

A study of patent records reveals how widespread is the thought, fathered by the wish, that something can be got for nothing.

Following are a few examples culled from patent records:

Aid to Propulsion

About 1908 a certain Captain R. W. Power, of Vancouver, patented an Aid to Propulsion. This consisted of a pipe or pipes running through the vessel and open at bow and stern. In these pipes hydraulic turbines were set, and to the shafts of these turbines power take-off shafts were connected through bevel gears. "By this means," reasoned the captain, "the power for all auxiliaries can be transmitted mechanically or generated electrically, without taking any steam from the main prime mover or diminishing the speed of the vessel. In fact, you can get greater speed with the same boiler plant, because all your steam is conserved from the main engines."

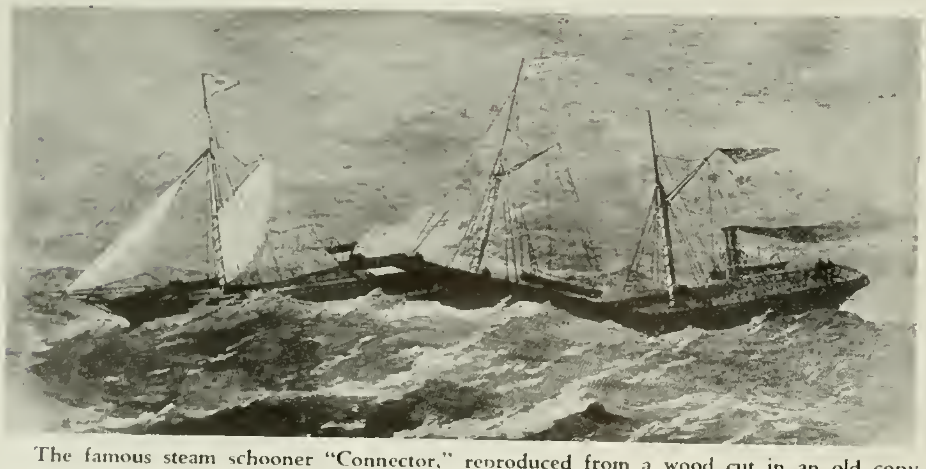
By an analogy with the action of a head of water on a turbine, the inventor proved to his own satisfaction that he could use the power of his prime mover to overcome hydrostatic resistance and at the same time turn that resistance into hydraulic power.

Propulsion by Wave Motion

Back in the fifties of last century, a ship was devised and actually built in thwartship hinged sections and with a small power plant in the stern section. It was proposed that, in those portions of the open sea where trade winds and waves progress rather steadily in one direction for long periods of time, this ship should be run with her sections free to undulate over the waves, and would thus have much greater propulsive efficency. So far as we know, only one ship was ever so built. The illustration shows this jointed power-saver. Her name was Connector.

While apparently only one of this kind was built, the idea did not die. As late as 1920 a Middle West civil engineer of some prominence obtained patents for a self-propelling ship and a wave motor, based on the same idea as the Connector. In the more modern version there were only two sections to the ship. The relative motion of these two sections around their connecting pins was transmitted to a shaft through suitable racks and pinions. This shaft drove a generator which supplied electric energy to the propulsion motor. In the wave motor form, the jointed vessel was moored just offshore and the power generated was to be conducted ashore through suitable cables.

The prospectus sent out describing this device carried maps dividing the coasts of the United States into zones, and setting an estimated value per unit for each zone. Units were to be built and leased to power companies at a price per unit based on the power estimates. To date we have seen no notice of any installations.



The famous steam schooner "Connector," reproduced from a wood cut in an old copy of Illustrated London News.

CLIPPER SHIP NAMES ON MODERN STEAMERS

In September's Beachcomber we gave "thumb-nail" histories of six American Clipper ships for which Maritime Commission cargo carriers of the C-2 type are being named. Here follow the stories of a famous trio of white-winged flyers that have been likewise honored.

These three vessels were acknowledged to be among the fastest vessels afloat eighty years ago, and in their class they would have no rivals today. Over the long ocean routes, the sailing ship was a large factor down to the close of the 19th century. It was not steam per se that drove her off the deep, but the advent of oil fuel.

From the haven of the present
She has cleared and sailed away,
Laden deep and running free
To the port of yesterday.
And the cargo that she carries,
Ah! it is not China tea;
She takes with her all the romance
And the glamour of the sea!

Flying Cloud

Extreme Clipper ship built by Donald McKay, of Boston, in 1851 for Grinnell, Mintern & Co., New York. Price $90,000. 235 feet x 40:8 x 21:6. 1782-48/95 tons, American old measurement.

Launched April 15, 1851, she sailed from New York June 2, 1851, under command of Capt. Josiah Perkins Cressy, and arrived at San Francisco August 31, hanging up a record of 89 days, 21 hours, anchor to anchor. On her fourth voyage she made the same passage in 89 days, 8 hours, the fastest sailing ship passage on that route for all time. Particulars of this run are:

Total distance logged	15,091 nautical miles
Best day's run	360 nautical miles
Poorest day's run	26 nautical miles
Average day's run	169 nautical miles
Average speed	7 knots
Best speed for 24 hours	15 knots
Best speed logged	18 knots

On her last and sixth run round Cape Horn, under command of Capt. Reynard, the Cloud started well but ran into big storms in the South Atlantic and had to put back to Rio for major repairs, which gave her a total elapsed time of 185 days, of which 44 were spent in Rio. On this passage she had the fastest day's run of her career 402 nautical miles, or an average speed of 16.2 knots. She left San Francisco for the last time on January 4, 1857, was laid up for nearly three years in New York, and then, under different owners, went into the London-China-Australia trade. In 1862 she was sold to British registry, and continued for some time in the Australian trade and later in the Canadian timber trade. Wrecked on Beacon Island in 1874.

Flying Fish

An extreme Clipper from the yards of Donald McKay, East Boston. 207 x 39:6 x 22; 1505 tons old measurement.

Owned by Sampson & Tappan, Boston; commanded during her career under American flag by Capt. Edward Nickels. Delivered in 1851. She left Boston on first voyage to San Francisco November 6, 1851. She was stranded November 23, 1858, at mouth of the Min River, after loading tea at Foo Chow for New York. She was gotten off after two days, but, being found badly damaged, was condemned, sold to a merchant firm at Manila, named El Bueno Suceso, and went under the Spanish flag. A few years later she was foundered in the China Sea.

Flying Fish was very similar in appearance to her builder's famous masterpiece, Flying Cloud, and had sharper ends. Some authorities considered her the faster ship. Her Cape Horn runs were always made at the seasons of unfavorable weather, and her average for the seven runs Westward was 105-4/7 days. Best of these runs was her second, on which she sailed from New York October 31, 1852, and arrived in San Francisco Bay January 31, 1853, having made the voyage from anchor up New York to anchor down San Francisco in 92 days 4 hours.

Captain Nickels always boasted of this ship that while under his command, "she had never been crawled up to or passed by another vessel."

Flying Cloud had six Cape Horn voyages to San Francisco, two of which were record 89-day passages. But her last voyage "shows an elapsed time of 185 days, which brings her average up to 113 days for the six trips. See story of Flying Cloud for details.

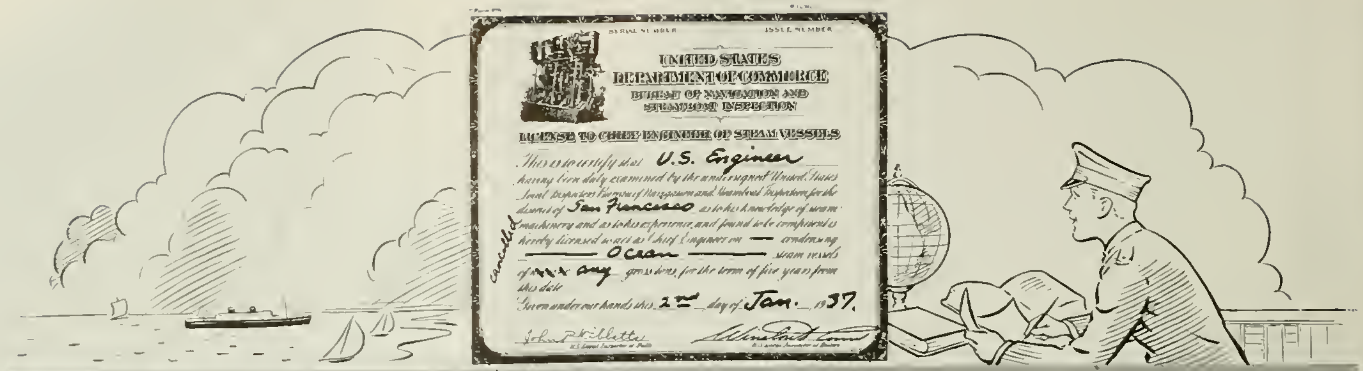
Sea Witch

Clipper ship, built in 1846 at the yard of Smith & Dimon, New York, to a model designed by John W. Griffith for Howland & Aspinwall. 170:3 x 33:11 x 19, and measuring 907-53/95 tons (old measurement). On her second and third voyages from New York to Hongkong and return, under the command of Capt. Robert H. (Bully) Waterman, she made record passages of 77 and 79 days from Whampoa to New York, on one of these passages logging 14,255 nautical miles at an average of 7½ knots.

On her last voyage she left New York April 5, 1855. Between New York and Rio her captain, George W. Fraser, was murdered by the mate and she put into Rio for orders. A Captain Lang was placed in command and completed the voyage to Hongkong. She sailed from Amoy December 1, 1855, with 500 coolies for Havana, and on March 28, 1856, 118 days out from Amoy, struck on a reef twelve miles from Havana and was a total loss.

Sea Witch made three voyages New York-San Francisco round the Horn, and six New York-Hongkong.

She had some remarkable sustained-speed runs, such as: Callao to Hongkong, logging 10,417 nautical miles in 52 days, an average of 8.375 knots; and 2,664 nautical miles in 10 consecutive days, an average of 11.1 knots.



SERIAL NUMBER
ISSUE NUMBER

UNITED STATES
DEPARTMENT OF COMMERCE
BUREAU OF NAVIGATION AND
STEAMBOAT INSPECTION

LICENSE TO CHIEF ENGINEER OF STEAM VESSELS

This is to certify that U.S. Engineer having been duly examined by the undersigned United States Local Inspectors Bureau of Navigation and Steamboat Inspection for the district of San Francisco as to his knowledge of steam machinery and as to his experience, and found to be competent is hereby licensed to act as Chief Engineer on — condensing — Ocean — steam vessels of ~~xxx~~ any gross tons, for the term of five years from this date

Given under our hands this 2nd day of Jan. 1937.

cancelled

John P. Willette
U.S. Local Inspector of Boilers

Your Problems Answered

by "The Chief"

"The Chief's" department welcomes questions—Just write "The Chief," Pacific Marine Review, 500 Sansome Street, San Francisco, California.

Feed Water Treatment

II Basic Considerations

The objectives in attempting to condition boiler feed water are:

(1) To prevent the formation of scale on water side of all surfaces, thereby preventing high temperature spots, resulting in blown tubes, and keeping the heat transfer through the tubes up to the maximum rate.

(2) To convert as far as possible all the water contamination into suspended particles, which will collect in the bottom drums, where as a sludge or mud it can be blown out.

(3) To eliminate corrosion, rust and pitting of all surfaces subject to water and steam.

(4) To prevent foaming or priming, with the resultant carry-over of water to engines, or, in the case where superheaters are used, to superheaters, where dust will form, passing on to engines.

(5) To accomplish all of the above at a minimum cost in a manner which is practical to operate with no interference with regular steaming program.

These objectives can be accomplished by a definite program, which includes:

(1) Accurate knowledge of the condition of the boiler water at all times. This involves regular daily tests conducted by the engineers, supplemented by more complete tests and general supervision of qualified chemists at periodic intervals.

(2) The addition of selected chemicals to the water under control conditions and in measured amounts.

(3) The regular or continuous blowdown of the bottom drums.

(4) Careful management of feed water when not in the boiler, to prevent contamination with air, oil or other substances.

There are two methods of boiler water treatment. The internal treatment involves adding chemicals to the feed as it goes to the boiler, either continuously at a measured rate or by the shot method, where at intervals it is put into the feed line in one shot or batch and routed to only one boiler at a time. This permits treating the boilers separately.

The external treatment is not used on marine boilers to any great extent but is quite popular with stationary plants. It involves the treatment of water in tanks or large quantities, then holding it ready for use as needed. This will remove most of the impurities and sludge before the water goes to the boilers. This method cannot be complete, however, as there will still be the necessity of testing boiler water, and some treatment for conditions which the external method cannot take care of.

In this series of articles we will discuss only the internal methods, as applied to marine boilers.

Hardness is a term applied to water. It is used frequently in a loose or general way. The terms *total hardness, soap hardness, calcium hardness, magnesium hardness* are used to have a more specific meaning.

The term comes from the feel of water when used as a wash water. The *harder* the water the less useful as a washing water, or the more soap needed.

Untreated water from wells, rivers, lakes or water supply systems is called *raw* water. Let the reader wash the hands in raw water with its natural hardness, then use distilled water, treated boiler feed or rain water to get the feel of the term *hardness*.

It is obvious that hardness in the water counteracts the effect of soap, or that soap counteracts the effect of hardness; further, that one of the principal functions of soap in washing is to treat the hardness in the water used. It will be shown later that some of the elements of soap are used in treating boiler water, and that neither too much nor too little can be used.

The hardness in the water is due to dissolved minerals. The water may be crystal clear yet very hard. It cannot be removed by passing the water through the finest filter. It can be reached only by chemical treatment.

Soap hardness, then, refers to the hardness in the water which can be affected by soap. Calcium hardness or magnesium hardness refer respectively to the hardness due to the particular mineral dissolved in the water. It is possible to remove one of these and leave the other. Clearly, it is a problem in chemistry.

The following on hardness is quoted from a paper by W. C. Roberts, consulting chemist:*

Minerals In Boiler Feed Waters

"The most important minerals in boiler feed water, from the standpoint of the operating engineer, are those containing calcium and magnesium. Calcium and magnesium are metals, the same as aluminum, iron and copper, although they are rarely seen in the pure state. They combine with other chemicals to form different minerals which are an important part of rocks and soil. They are slowly removed from the rocks and soil by the leaching action of water, and thus are found in well waters, rivers, and at last in the ocean. The quantity of these calcium and magnesium minerals in different waters varies greatly, depending on the source of the water and upon the kind of rocks and soil over or through which the water has passed.

"These calcium and magnesium minerals form the 'hardness' of water and are the cause of most boiler scale.

"There is usually more calcium than magnesium in boiler feed waters. When one unit of calcium is combined with two units of carbonic acid (carbon dioxide) a mineral is formed called calcium bicarbonate. If one unit of calcium is combined with only one unit of carbonic acid, a mineral is formed called calcium carbonate. If calcium bicarbonate is present in boiling water then one of its carbonic acid units is removed by the heat and is carried off in steam, and calcium carbonate is formed in the water. This is important in boiler operation, since much of the calcium in boiler feed water is in the form of the bicarbonate, which is quite soluble. Calcium carbonate is only slightly soluble and is the form of scale most frequently found in boilers.

"Magnesium also occurs as the bicarbonate and is changed to the carbonate by heating the feed water to boiling. Magnesium carbonate is more soluble than calcium carbonate and is not so often found as scale.

"Other scale-forming minerals found in water are calcium sulphate, magnesium sulphate, calicum chloride and magnesium chloride. Calcium sulphate is not very soluble, and forms calcium sulphate scale. The other three minerals are quite soluble and do not form scale themselves, but may be acted upon by other chemicals and be changed into minerals that do form scale. The calcium chloride and magnesium chloride minerals may cause acid corrosion of boiler metal, so their removal from boiler water is very important.

"Silica is the most common mineral found in rocks and soil, but it is not very soluble in water. It is, however, found in small quantities in many feed waters, and often forms scale, usually in the form of calcium and magnesium silicates. Sand and dirt in water may also form silicate scale in a boiler, so that boiler feed waters should be clear and free from sediment.

"Iron is seldom found in boiler feed waters, except in very small amounts. Most of the iron found in boiler scale is the result of iron corrosion in the boiler system.

"Feed waters also contain other minerals, but the only other ones of importance to this discussion are sodium chloride and sodium sulphate. These minerals do not form scale but are important in other ways, which will be mentioned later. Other minerals may be of importance in certain instances but are not of sufficient general interest to mention here."

In studying these or any articles on this subject, it is highly desirable that the reader learn what the several chemicals or minerals are. This can be done by referring to the tabulation of chemicals which appeared in the September, 1939, issue of Pacific Marine Review.

For instance, we know that sodium chloride is common salt. But what is calcium sulphate? By referring to the table, we learn that it is a white crystal or mineral called gypsum, which, if baked in an oven to drive off the water of crystallization, becomes plaster of Paris, a very fine cement. When water is added to plaster of Paris to add back the water of crystallization, the crystals slowly form again, interlocking with each other to make a rigid and firm mass, which may be a model of the Statue of Liberty in one case or a hard scale on a boiler tube in the other case.

The terms solubility, saturated solution, and concentration are used in reference to the phenomenon of solution of chemicals in liquids. It is important that we learn something of this.

A great many substances will dissolve to some extent in water; few to a large extent. For instance, metals will dissolve very slightly, but most salts will dissolve in water to a large degree. Nine pounds, but not more, of Epsom salts can be dissolved in 10 pounds of water. The solution will weigh 19 pounds, but the volume will not be nearly as great as the sum of the two volumes before adding.

When adding a soluble substance to water, a point will be reached where no more will go into solution. Instead it will remain suspended as particles or settle as a sludge to the bottom. No amount of stirring will cause more to dissolve. This point is called saturation. The solution is said to be saturated. Removal of the liquid by evaporation will cause the substance to leave the solution and settle out as solid particles.

The point of saturation can be expressed as a ratio of the weight of substance to weight of liquid, or parts of subtsance by weight to a million parts of liquid by weights, or simply parts per million, abbreviated p.p.m.

The point of saturation is affected

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*Internal Boiler Water Treatment, by W. C. Roberts, Pacific Engineering Laboratories. Copies may be obtained by addressing "The Chief," enclosing 25c.

by temperature of the solution, pressure, and the presence of other chemicals.

Liquids and gases also dissolve in other liquids. Alcohol dissolves readily in water. Carbon dioxide and oxygen or air also.

Concentration of a solution is a term applied to the process of evaporating off the liquid, thereby increasing the ratio or p.p.m. of the dissolved substance to the liquid. Thus the process of steaming a boiler is continually concentrating the solution of chemicals in the boiler. Without the regular blowdown, the boiler would be filled up with solid substances or sludge.

Our next and succeeding articles will discuss scale formation, water impurities, corrosion, priming, alkalinity and acids, chemicals used in treatment, and tests and testing chemicals.

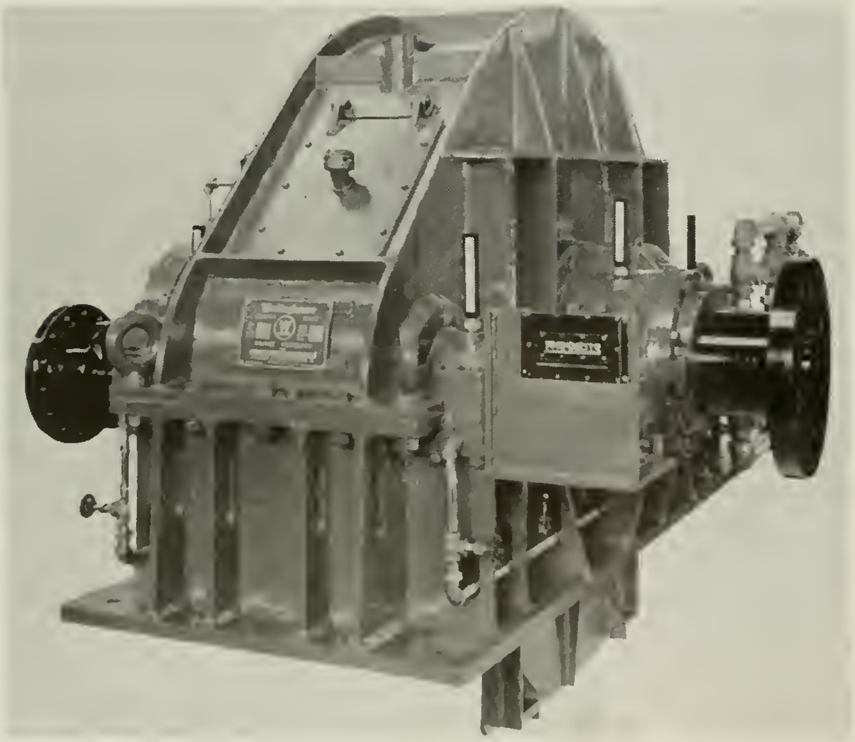
Engineers' Licenses

Name and Grade	Class	Condition
SAN FRANCISCO		
Daniel C. Seed, Chief Eng.	OSS, any GT	RG
John R. Young, 1st Asst. Eng.	OSS, any GT	RG
Vincent Wolden, 1st Asst. Eng.	OSS, any GT	RG
Theodore H. Matthiessan, 1st Asst. Eng.	OSS, any GT	RG
Clyde C. Ermill, 1st Asst. Eng.	OSS, any GT	RG
William N. Pierce, 1st Asst. Eng.	OSS, any GT	RG
Alfred S. Churchill, 2nd Asst. Eng.	OSS, any GT	O
John A. Friesen, 2nd Asst. Eng.	OSS, any GT	O
Chief Eng.	OMS, any GT	RG
Frank D. Owen, 2nd Asst. Eng.	OSS, any GT	O
Edward W. DeMartini, 2nd Asst. Eng.	OSS, any GT	RG
George H. Betts, 2nd Asst. Eng.	OSS, any GT	RG
Clarence E. Clemens, 2nd Asst. Eng.	OSS, any GT	RG
Charles B. Graves, Chief Eng.	OMS, any GT	O
SAN PEDRO		
Michael R. Manning, Chief Eng.	OSS, any GT	RG
William D. De Munbrun, 3rd Asst. Eng.	OSS, any GT	O
JUNEAU		
Reidar Foss, Chief Eng.	OMS, any GT	RG

Abbreviations: GT is gross tonnage; RG is raised grade; O is original license; OSS is ocean steamer; OMS is ocean motorship.

A NEW LINE OF MARINE PROPULSION SPEED REDUCERS

A new line of marine gears for main propulsion drives has been announced by the Westinghouse Electric & Manufacturing Company. The gears are enclosed in oiltight fabricated housings using cast-steel bearings hubs and steel plate assembled by welding to form a well-proportioned and rugged design. This case absorbs the full thrust of the propeller as well as the reactions from the gear mesh.

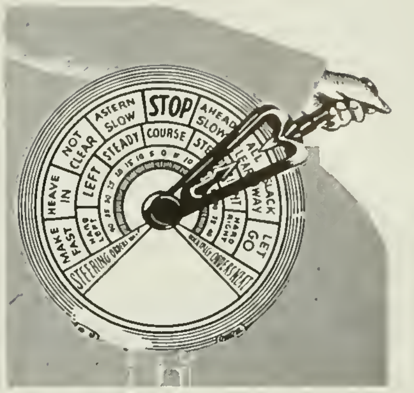


Gearing is of the double helical type and is generated by the continuous hobbing process. Pinions are forged integrally with their shafts, and the cast-steel gear is held to the low-speed shaft by a combination of press fit and key. All bearings, which are of the sleeve type, may be inspected or replaced without disturbing the upper section of the case by removing the bearing caps and rolling the bearing shells out. The thrust bearing is built into the forward end of the housing. Each bearing housing is provided with a mercury thermometer to indicate bearing temperature.

A revolution counter, gear driven from one of the pinion shafts, records the revolutions of the propeller shaft. The new line of gears is made to conform to specifications of the American Bureau of Shipping and the United States Navy Department. Each unit is designed and engineered to fit the specific power requirements of the application.

Steady as you go!

KNOWLEDGE IS THE STRAIGHT COURSE TO ADVANCEMENT



A Department for Deck Officers

By "The Skipper"

Questions Welcomed. Just Address "The Skipper," Pacific Marine Review, 500 Sansome Street, San Francisco, California.

New Examination Requirements For American Deck Officers

As your new "Skipper" mounts the bridge to "take over," as announced in last month's issue, troublous times and stormy international weather are threatened from all quarters. May we hope and pray that a repetition of the ruthless destruction of shipping which occurred during the last war, with loss of life or privation to so many of our calling, may be avoided.

Readers of these notes may have read the article from the pen of our shipmate, "The Chief," which appeared in last month's issue, outlining the New Examination Requirements for Engineers' Licenses, as recently announced by the Bureau of Marine Inspection and Navigation. These new rules will affect in like manner the Deck Officer. The object is to promote the advancement and elevation of our profession, and although the changes and requirements may appear drastic, they should eventually react favorably to all of us.

The methods of conducting examinations will be changed. Instead of questions being prepared by local inspection offices, as at present, it is proposed to have sets of examinations compiled at the Bureau in Washington, D. C. These will then be sent, under seal, to the 48 field offices, and the seals will not be broken until the candidates are assembled for examination. Under this new system the examinations on any day at any port in the United States and its possessions will be identical.

It is the Bureau's ultimate aim to have the candidates' papers first checked by the examiners at local centers, and thereafter sent to Washington for final grading and review by a special staff to ensure equal standards of marking.

Also there's an important announcement to the effect that, in the course of the next three years, it is intended to place more and more emphasis upon the theory as well as the practice of navigation and engineering. The examinations will be stepped up each year in easy stages during the three-year period, and will then be kept up to date

Deck Officers' Licenses for September

Name and Grade	Class	Condition
SAN FRANCISCO		
Alfred C. Aitken, Jr., Master	OSS, any GT	RG
Carl E. Johansen, Master	OSS, any GT	RG
Rinaldo Bellero, 2nd Mate	OSS, any GT	RG
Frederick H. Fowler, Jr., 2nd Mate	OSS, any GT	RG
Sydney O. Olsen, 3d Mate	OSS, any GT	O
Paul T. Borden, 3d Mate	OSS, any GT	O
HONOLULU		
Eli Kala Laa, 2nd Mate	OSS and OMS, 5000 GT Pac. Ocean bet. ports of Hawaiian Islands	O
PORTLAND		
Julius Richter, Master	OMS&OSS, any GT	RG
Robert K. Adamson, Master	OMS&OSS, any GT	RG
SEATTLE		
Robert J. Blood, 3d Mate	OSS, any GT	O
HOQUIAM		
Donald S. McLeod, 3d Mate	OMS&OSS, any GT	O
JUNEAU		
Don S. Wright, 3d Mate	OSS, any GT	RG

Abbreviations: GT is gross tonnage; RG is raised grade; O is original license; OSS is ocean steamer; OMS is ocean motorship.

EXAMINATIONS REQUIRED FOR MASTERS AND MATES

Any applicant for a license as third mate, second mate, chief mate or master of ocean steam and motor vessels, shall be required to pass a satisfactory examination as to his knowledge of the subjects listed below:

Third Mate, Second Mate, Chief Mate and Master of Ocean Steam and Motor Vessels	Third Mate	Second Mate	Chief Mate	Master
Navigational definitions	1	......	......	......
Instruments and accessories used in navigation	1	1	1	1
Knowledge of principles	1	1	......	......
Plane, parallel, middle latitude and Mercator sailing	1	1	1	......
Ship's position by dead reckoning	1	1	1	1
Tides and currents	1	1	1	1
Deviation by azimuth or amplitude, either separately or in conjunction with observations of celestial bodies	1	1	1	1
Chart navigation	1	1	1	1
Chart construction	......	......	......	1
Latitude by meridian altitude of sun, star, or moon	......	1	......	......
Latitude by Polaris	1	1	......	......
Latitude by Polaris and by a planet	......	......	1	1
Latitude and position line by reduction to meridian, sun or star	......	......	1	......
Latitude and position line by reduction to meridian, sun, star, moon or planet	......	......	......	1
Longitude and position line, by sun	1	......	......	......
Longitude and position line, by sun or star	......	1	......	......
Longitude, position lines, and "fix," by sun, star, or moon	......	......	1	......
Longitude, position lines, and "fix," by sun, star, moon, or planet	......	......	......	1
Great circle sailing	......	......	1	1
Speed by revolutions	1	1	1	......
Engineering knowledge, speed by revolutions, economy in fuel consumption	......	......	......	1
Change in draft due to change in density of water, load lines, etc.	......	......	1	1
International and Inland rules of the road	1	1	1	1
International code flag signaling, storm signals, Morse and semaphore signaling	1	1	1	1
Precautions to be taken against fire or explosions from oil or gas, etc.; spontaneous combustion. Handling of vessel after fire is discovered, and methods of dealing with fire. Use of fire detecting and extinguishing apparatus, mechanical and chemical fire extinguishers, oxygen and gas masks, fresh air breathing apparatus, safety lamps, etc. Emergency drills, organization, etc.	1	1	1	1
Cargo handling and stowage, including carriage of refrigerated cargoes, and with particular reference to dangerous cargoes, oil in bulk, etc., ventilation of holds and other enclosed spaces	1	1	1	*
Ventilation of cargo holds, etc.	......	......	......	1
Determination of area and volume (mensuration)	......	1	......	......
Gun and rocket apparatus, breeches buoy, etc.	1	1	1	......
Seamanship	1	1	1	1
Ship construction and stability	......	......	1	1
Code of signals used between the bridge and engine room for working the engine	1	......	......	......
Meteorology	......	......	1	1
Deviation and compass compensation, Napier diagram	......	......	......	1
Ship sanitation	......	......	......	1
Essay (test of knowledge and expression, not of technical knowledge)	......	......	......	1
Ship's business, admiralty law, salvage, etc.	......	......	......	1
United States Navigation laws	......	......	......	1
United States laws governing marine inspection	......	......	1	1
Rules and regulations of the Board of Supervising Inspectors	1	1	1	1
Such further examination of a general nature, including oral, as may be required	1	1	1	1

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*(Cargo handling will not be given to masters, although they should be prepared to answer questions on cargo under the heading of ship's business. Applicants for a master's license who have not previously held a chief mate's license will, however, be given an examination in cargo handling similar to that given chief mates.)

with the professional and technical advances made by the industry. In addition, subjects now given in the higher grades only will also be given in the lower grades.

The Bureau has also been making an intensive research during the past year, and proposes to effect a complete revision of the rules governing the experience and qualifications of licensed officers, in addition to making the changes in examination methods and standards as before mentioned. Experience requirements have been made considerably more exacting, and inconsistencies removed. Just exactly what these changes will amount to has not yet been announced, but will very likely appear in the official bulletin in due course and will be communicated to our readers insofar as they may affect our interests.

The subjects that will now be required in examinations for licenses in the various grades are indicated in the table herewith.

Mathematical proofs of formulas will not be required, but the truth of a formula should be demonstrated by means of a figure where possible. Prospective candidates should therefore study and become conversant with the fundamental technical ideas and processes required in their work at sea, particularly the following:

(1) The reading of simple graphical diagrams, such as weather, statistics, stability, curves, etc.

(2) The practical use of logarithms to base 10; their use in simple calculations involving multiplication, division, simple powers and roots.

(3) Areas and perimeters of rectangle, triangle, circle, areas and volumes of box-shaped bodies, cylinders and wedges. Practical applications, i.e., weights of contents of bunkers, of general cargo of varied shapes; capacities of holds and bunkers.

(4) Plane sections of a sphere. Great and small circles.

Formation of spherical triangle. Sides and angles of spherical triangles.

(5) Trigonometrical ratios, and the simple relations between same; sine, cosine, tangent, cosecant, secant, cotangent, haversine. The solution of a plane right-angled triangle. Use of the Traverse Tables for solving right-angled triangles. Practical problems on same, i.e., doubling the angle on the bow, four-point bearings, danger angles, distance from a point of land of known height, etc.

(6) Solution of the spherical triangle.

(7) A general understanding of the earth and its daily and annual movements; movements of the heavenly bodies; time, hour angles, etc.; the geographical position of a heavenly body; the circle of position and the position line; the magnetic meridian; the Mercator's chart, etc.

Change of Masters

Steamer Captain A. F. Lucas: H. O. Bleumchem; vice, R. Weishear.
Steamer Brandywine: R. K. Countryman; vice, Thos. Klittgard.
M.S. Hawaiian Standard: R. M. Stall; vice, L. E. Haskell.
Steamer H. M. Storey: Thomas A. Hill; vice R. M. Stall.
Steamer Cathwood: O. Phillipson; vice, H. Younberg.
Steamer H. D. Collier: S. C. Sullivan; vice, J. Fox.
Steamer Coloradan: R. M. Pierce; vice, C. Grundy.
Steamer J. C. Fitzsimmons: J. S. Christenson; vice, S. S. Dunnell.
Steamer W. S. Rheem: Joseph Fox; vice, J. S. Christenson.
Steamer Utahan: E. B. Vaux; vice, J. B. Knowles.
Steamer Cuzco: J. Reznik; vice, R. J. Tierney.
Steamer Warwick: H. L. Dahloff; vice, Otto Weideman.
Steamer Mathew Luckenbach; A. N. Borden; vice, C. T. Torzuesen.
Steamer West Shipper: K. Mesak; vice, Karl Moden.
Steamer Dorothy Luckenbach: Martine Jurkops; vice, S. Neslund.
Steamer Camden: F. D. Arthur; vice, F. B. Waite.
Steamer Kewanee: F. H. Rosvally; vice, D. D. Maclean.
Whl. Tug Port Saunders: Olaf Hansen; vice, D. J.Diedrick.
M.S. H. T. Harper: A.H.Koshkin; vice, C. Baker.

Safe-Line Wire Rope Clamp

The "Safe-Line" wire rope clamp, manufactured and marketed by the National Production Company of Detroit, Michigan, has neatness in streamline design; double holding power; ease of assembly; safety for employees; and low cost.

The inner surface, which grips the wire rope, is double spiral splined to fit each strand and wire of the rope, thus making a perfect and secure grip on each section of each wire and strand. The gripping halves of the clamp are held tightly to the rope by taper threaded nuts. The clamp is made of high tensile strength steel and is guaranteed to outpull any wire rope made. Stock sizes are for ropes ⅛ inch to ¾ inch.

Safety engineers give "Safe-Line" approval on sight because it leaves no sharp wire ends nor projections to injure men who work with it.

Unlike a spliced joint or zinced-in socket, a joint made with this clamp can be quickly readjusted to the proper tension without additional expense, and it can be used over and over again.

Main Propulsion Gears For C-3s at Moore's

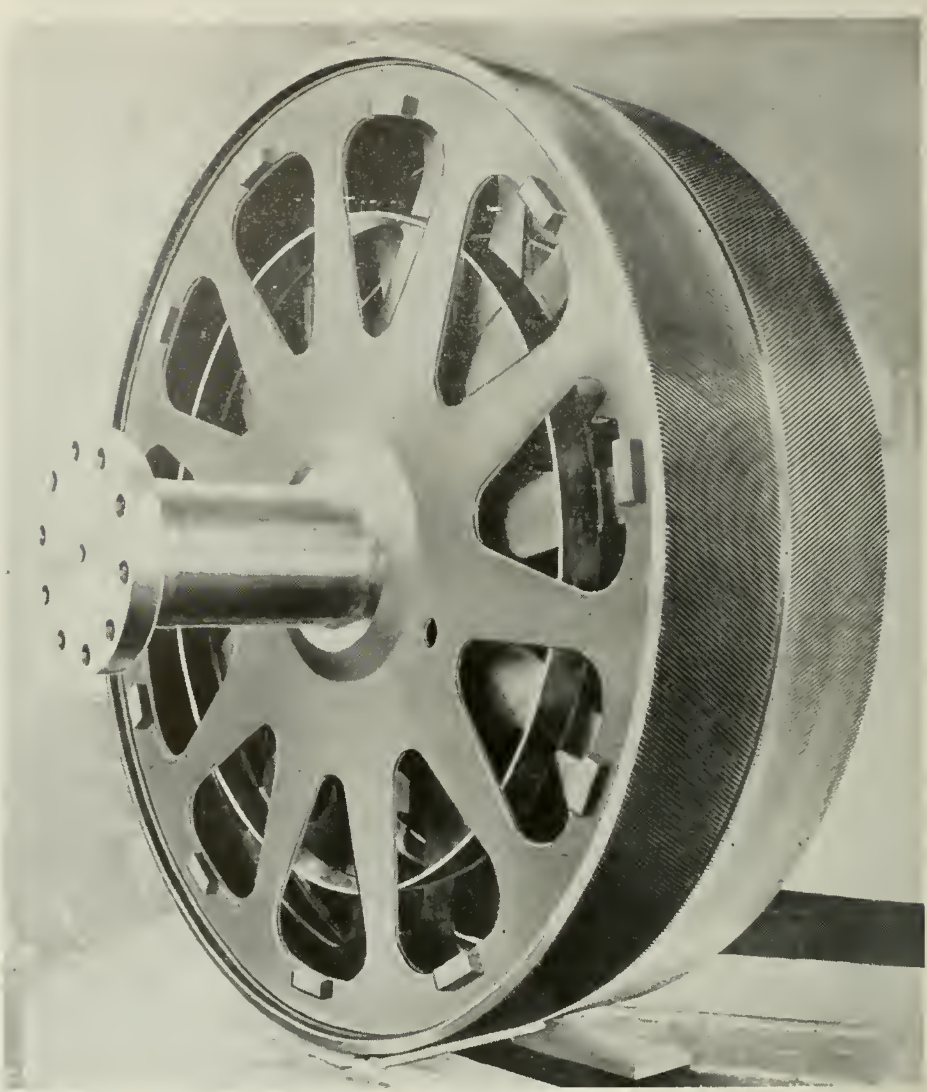
The first two of the four C-3 type cargo liners now under construction at the yard of the Moore Dry Dock Company, Oakland, California, will be propelled by DeLaval cross compound double reduction geared turbines with a normal rating of 8,500 shaft horsepower when the propeller is turning over at 85 r.p.m. These units are identical with six sets being furnished by the De Laval Steam Turbine Company of Trenton, New Jersey.

Each unit will include: a high-pressure turbine; a low-pressure turbine with an astern element included in its casing; two high-speed pinions and two high-speed gears; two low-speed pinions and one low-speed gear. The units must be capable of continuous operation at 10 per cent above normal rating, or at 9,350 shaft horsepower at 88 r.p.m. of propeller shaft.

The high-pressure turbine has 11 stages, and operates normally at 5,012 r.p.m. The low-pressure turbine has seven ahead and three astern stages, and operates normally at 3,459 r.p.m. Steam will be supplied to the throttle at 440 pounds per square inch gage pressure and at 740° F. temperature. The condenser arrangement will be such as to provide an exhaust vacuum of 28½ inches mercury.

Diagrammatic arrangement of these units, and complete machinery space arrangement plans of these ships, were published in Pacific Marine Review for February, 1939.

The illustration herewith depicts a finished low-speed gear for one of these turbine units, as set up in the De Laval shops.



De Laval main propulsion gear for C-3 cargo vessels.

This double helical gear has a pitch diameter of 153.749 inches, or 12 feet 9.74 inches. Its double working face has a net width of 38.5 inches, or 3 feet 2.5 inches. It will be directly coupled to the propeller shaft and will transmit 8,500 horsepower to that shaft when turned at 85 r.p.m. by the two slow-speed pinions. Each of these pinions has a diameter of 17.9 inches and each rotates at 729.2 revolutions per minute for normal rating.

So far as we know, these are the largest marine gears ever built for a cargo carrier.

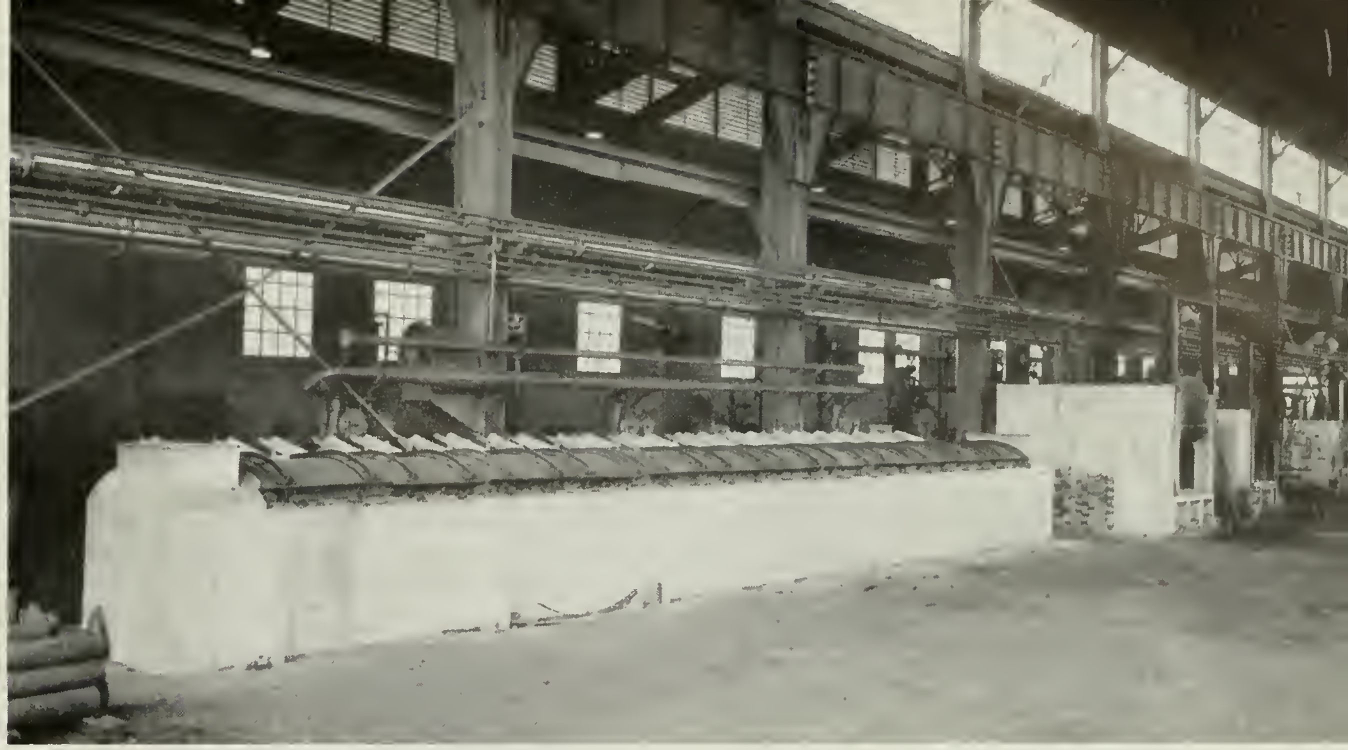
Space-Saving Noise Snubbers

A new series, known as the Burgess SDHC series of Snubbers, is announced by the Acoustic Division of Burgess Battery Company.

The new line covers a range of standard pipe sizes from 1 to 32 inches. Both size and weight have been reduced by a unique rearrangement of the controlling parts.

Another change in the new design lies in the substitution of concentric connections for eccentric connections to facilitate installation. Sizes 1 to 4 inches are provided with nipple connections, while sizes 5 inches and larger are provided with flange connections.

The addition of smaller and lighter snubbers to the Burgess line, introduced last year, enables engineers to solve their silencing problems on difficult marine and crowded stationary installations.



Three Knapp furnaces in a San Francisco shipyard.

GAS-FIRED FURNACES

For Pacific Coast Shipyards

In modern shipbuilding many forgings are used for various purposes involving heavy strain and/or shock, and it is very desirable that shipyards be equipped with furnaces for adequately heat treating such items. This holds good not only with new construction but even more on repair and reconditioning jobs.

It is fortunate, therefore, for Pacific Coast shipyards that there is located at Los Angeles an organization noted for its gas fired industrial heat treating furnaces and for its heat control applications.

The James H. Knapp Company, Inc., has supplied very satisfactory furnaces for general and special heat treating requirements to several Pacific Coast shipyards.

Our illustration shows an installation of these furnaces in the forge shop of a San Francisco shipyard. This installation includes:

One special furnace for long forgings. This furnace is fitted with sectional covers, and the furnace pit can be divided by portable partitions. The total length is 42′ 6″.

Two 4′ x 4′ 6″ furnaces for heat treating miscellaneous forgings.

The long furnace enables this yard to heat treat the longest tail or line propeller shaft lengths. Its divisibility into sections makes it an economical unit for heat treating one or more forgings in any length too great for the smaller furnaces.

A Knapp gas-fired furnace 3′ 0″ wide and 51′ 0″ long has very recently been installed by the Consolidated Steel Corp. of Los Angeles for heating beams, frames and channels for ship construction work.

The James H. Knapp Company, Inc., maintains a competent technical staff, and will be glad to give your furnace problems the benefit of its experience and skill.

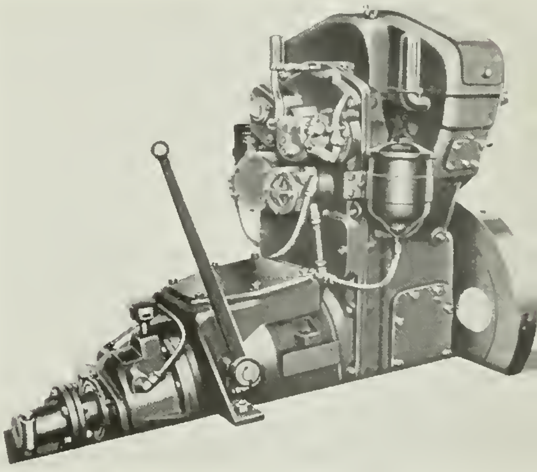
SMALL "V" TYPE MARINE DIESEL

Fairbanks-Morse announces a new small diesel, to be known as Model 45-A Marine Diesel. This engine is built in one and two cylinder sizes, to give 5 and 10 horsepower capacity, respectively. The Model 45-A two cylinder unit is a V-type engine and is available for propulsion service in small boats as well as for auxiliary drive.

With 3½-inch bore and 4¾-inch stroke, this engine operates at 1200 r.p.m., and is conservatively rated as to horsepower and piston speed. The F-M Model 45-A engine is a four-cycle, solid injection, full diesel type, precision built, with full pressure lubrication. One of the many features of this engine is the fact that it can readily be started by hand.

For marine propulsion, the engine is arranged with a Joes reverse gear, and the flywheel is placed forward. For auxiliary generating service, the engine is direct connected to an F-M Marine type generator, forming a compact unit mounted on a substantial cast-iron base.

The F-M Model 45-A Diesel combines the reliability and economy of operation and other advantages usually found only in larger diesel engines.



Fairbanks-Morse V type marine diesel.

On the Ways—

SHIPS IN THE MAKING

LATEST NEWS FROM AMERICAN SHIPYARDS

New Boom In American Tanker Contracts

Overlooked in the rush of contracts from the U. S. Maritime Commission, a quite sizable boom in tanker construction is gaining momentum in American shipyards. Ten large seagoing oil carriers were quietly ordered during September, according to American Bureau of Shipping records.

Standard Oil of New Jersey ordered five, as follows: 2 diesel drive, 11,400 gross tons, from Sun Shipbuilding and Dry Dock Co.; 2 steam drive, 7,700 gross tons, from Federal Shipbuilding and Dry Dock Co.; and 1 steam drive, 7,600 gross tons, from Bethlehem Steel Co., Sparrows Point yard.

Standard Oil of California ordered 1 steam drive, 5,200 gross tons, from Sun Shipbuilding and Dry Dock Co.

The Texas Co. ordered 1 steam drive, 9,600 gross tons, from Sun Shipbuilding and Dry Dock Co. This one is evidently to be a fast ship, as she is to have 9,000 S.H.P.

Atlantic Refining Co. ordered 1 turbo-electric drive, 11,400 gross tons, from Sun Shipbuilding and Dry Dock Co.

Sun Oil Co. ordered 1 diesel drive, 11,400 gross tons, from Sun Shipbuilding and Dry Dock Co.

National Bulk Carriers Inc. ordered 1, of 11,200 gross tons, from Welding Shipyards Inc., Norfolk, Va.

Here we see a very encouraging trend for the shipbuilder. Ten large tankers, aggregating 95,600 gross tons, ordered from American shipyards during one month on a purely commercial basis, is good business.

U. S. Maritime Commission New Contract Awards

Eight C-2s Reawarded to Sun

The United States Maritime Commission on October 7 awarded the Sun Shipbuilding and Dry Dock Company, Chester, Pennsylvania, a contract for construction of eight single screw, direct drive diesel cargo vessels of its C-2 design at a price of $2,277,000 each.

These ships are 459 feet overall, 63 feet wide, 13,900 tons displacement, cargo capacity 7,549 tons and speed of 15½ knots.

These are the same eight ships which were announced as awarded to the Sun Yard late in September.

Bids were retaken and the contract awarded again because of a desire on the part of the builder to make several slight changes in the contracts. The twenty C-2 type ships on which bids were received on September 19 have been allocated as follows: Tampa Shipbuilding and Engineering Company, Tampa Florida, four; Sun Shipbuilding and Dry Dock Company, Chester, Pennsylvania, eight; and Federal Shipbuilding and Dry Dock Company, eight.

Federal Gets Eight C-2s

The United States Maritime Commission on October 10 awarded the Federal Shipbuilding and Dry Dock Company, Kearny, New Jersey, a contract for construction of eight single screw, steam propelled cargo vessels of its C-2 design at a price of $2,124,500 each.

These ships are 459 feet overall, 63 feet wide, 13,900 tons displacement, cargo capacity 7,549 tons, and speed 15½ knots.

The award completes the allotted number of C-2 ships which the Commission had scheduled for construction, making a total of 40 C-2 ships on order.

Another Combination C-3 To Newport News

The United States Maritime Commission on September 28 announced the award of a contract for construction of one single screw, C-3 type, steam propelled combination passenger and cargo vessel to the Newport News Shipbuilding and Dry Dock Company, Newport News, Virginia, at a price of $3,630,000. The Newport News bid was made September 20 on an adjusted price basis.

The vessel is intended for the round-the-world service of the American President Lines, and brings to seven the number of vessels of that type, all of which are being built at the Newport News yard.

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and ENGINEERS

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SAN FRANCISCO OFFICE AND PLANT
Machine Shop
and
General Repairs
1100 SANSOME STREET
Tel.: SUtter 0221

ALAMEDA PLANT
Two Dry Docks
3,000 tons and 5,000 tons
capacity
FOOT OF SCHILLER STREET
Tel.: ALameda 0533

GENERAL ENGINEERING
and DRY DOCK COMPANY

The C-3 combination passenger and cargo vessel is 492' long, has a displacement of 16,190 tons, and will travel at 16½ knots and has accommodations for 96 passengers.

Two More C-3s to Moore Dry Dock

The United States Maritime Commission on October 14 awarded the Moore Dry Dock Company, Oakland, California, a contract for construction of two single screw, steam propelled cargo vessels of its C-3 design at a price of $2,753,000 each.

This is the second pair of C-3 cargo carriers to be awarded the Moore Dry Dock Company. The first C-3 type vessel launched in the Maritime Commission shipbuilding program was christened Sea Arrow and put over on September 15, nearly a month before the first C-3 launched in an Atlantic Coast shipyard.

This demonstration of ability in a Pacific Coast shipyard is largely responsible for the fine group of contracts that have been awarded to West Coast yards during the past 60 days.

These ships are 492 feet overall, 69 feet wide, 17,600 tons displacement, and speed 16½ knots.

The award brings the number of ships ordered under the Commission's construction program to 139, of which 25 have been launched.

Two C-1s to Pennsylvania Shipyard, Inc.

The United States Maritime Commission on October 4 announced award of a contract for construction of two C-1 type, full scantling, diesel propelled ships to the Pennsylvania Shipyard, Inc., Beaumont, Texas, at a price of $1,990,000 each. Bids for C-1 type vessels were opened July 11, 1939.

This brings to 36 the number of C-1 cargo ships ordered by the Commission. The other yards to which C-1s have been awarded are: Bethlehem Staten Island Plant, 5; Bethlehem Sparrows Point, 5; Bethlehem Union Plant, San Francisco, 5; Western Pipe and Steel, San Francisco, 5; Consolidated Steel Corp., Los Angeles, 4; Seattle-Tacoma Shipbuilding Company, Tacoma, 5; and Federal Shipbuilding and Dry Dock Co., 5.

The C-1 ships are 416 feet overall, breadth 60 feet, and displacement 12,875 tons.

Todd "V.C." Burners For Eight Ships

Further evidence of the efficiency and economy of the new Todd Variable Capacity Mechanical Pressure Atomizing Burner is seen by officials of Todd Combustion Equipment, Inc., in an order received October 18 for fuel oil burning equipment for eight more U. S. Maritime Commission cargo liners of the C-2 design.

The order, received from the Federal Shipbuilding & Dry Dock Co., Kearny, N. J., specifies that each vessel shall have two water tube boilers fired by six Todd "Hex-Press" model forced draft double casing insulated type air registers complete with Todd Variable Mechanical Pressure fuel oil burners, making a total of 48 for the eight ships.

These new C-2 vessels will be identical in construction and equipment to their sister-ship Challenge, which has set such a high record of efficiency for vessels of this type. The Challenge is fitted with six Todd "Hex-Press" forced draft air registers, insulated type, fitted with check housing and variable capacity mechanical pressure atomizing burners.

Sun Launches M. S. Mormacpenn

The first of the Maritime Commission's C-3 type cargo ships to be launched on the East Coast was the M. S. Mormacpenn, which slid from the ways of the Sun Shipbuilding and Dry Dock Company, Chester, Pa., at 11:30 a.m. Wednesday, October 11.

This vessel is scheduled for the Moore-McCormack Lines' service from New York to East Coast ports of South America. She was sponsored by Miss Harriet Ann Malloy, Brooklyn, New York, daughter of Henry P. Malloy, general counsel and vice president of Moore-McCormack Lines, Inc.

Three other C-3 type cargo ships are scheduled to join the Mormacpenn in the South American service.

Their dimensions are:

Length overall	492 feet
Beam	69 feet
Draft	28 feet, 6 in.
Propulsion power	8,500 B.H.P.
Normal sea speed	16½ knots
Passengers	12
Gross tonnage	7,680
Dwt. tonnage	11,735

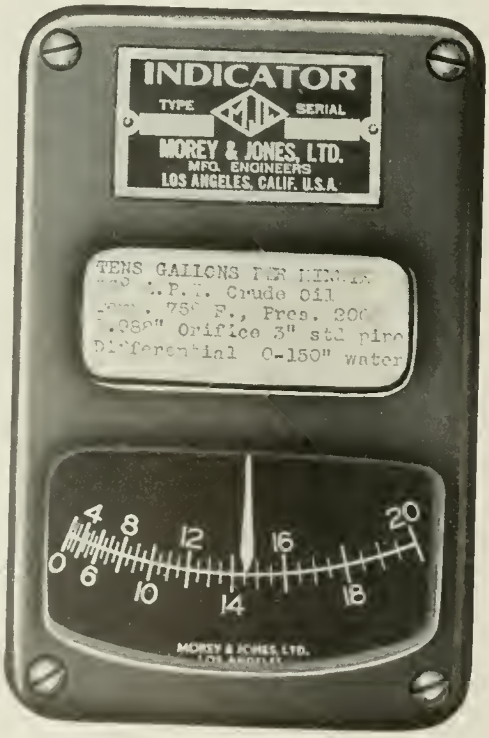
The power plant consists of four Busch Sulzer Diesel engines connected to a single screw shaft through hydraulic clutches and speed reduction mechanical gearing.

The Mormacpenn is the 25th ocean-going ship to be launched in the Maritime Commission's construction program.

Rate of Flow and Liquid Level Indicator

The MJL No. 98 Rate of Flow Indicator is especially suited to purposes such as: Indicating the flow of liquids, steam and gases in all process industries; for balancing flows in refineries and absorption plants; for indicating rate of flow of cooling water and lubricating oils to bearings in prime-movers, cooling water to condensers and electrical transformers and water to filters and softeners; as well as for indicating liquid levels in boilers and tanks, whether under pressure or not.

When used as a flow indicator, this instrument is actuated by the differential pressure produced by a primary device such as an orifice, venturi tube, or pitot tube, inserted in the pipe line. The differential pressure is balanced by a calibrated bellows unit which moves in direct relation to the pressure applied. This movement is transmitted to a pointer, and, since the flow varies as the square root of the differential pressure, the scale may be furnished to read directly in any units of flow desired, simply by using a square root scale of suitable range.



Front View

The calibrated bellows unit eliminates the conventional mercury column, thus removing any possibility of contamination to the fluid in the line by the mercury itself, or of injury to copper or brass fittings with which mercury amalgamates. Since the mechanism responds instantly to changes in flow rate or differential pressure, and has a relatively small displacement, practically no accumulated error will result in the readings, although the leads to the instrument are throttled in order to reduce the effect of surges or pulsation in the line.

The MJL Flow Indictator does not have to be accurately leveled, and for this reason may be transported in any position without locking any parts in place. For the same reason it can be used in many installations where more delicate instruments would be quickly thrown out of adjustment, such as on boats, floating platforms, airplanes or locomotives.

Due to the unique principle involved, the instrument may be calibrated for any differential pressure range between 0-30" and 0-225" of water. Permanent calibration is assured by rigid material specifications and by working the spring well within its elastic limit.

Either high or low alarm contacts, or both, may be supplied to operate a signaling device when the flow or liquid level reaches any predetermined point.

The MJL Rate of Flow Indicator is manufactured by Morey & Jones, Ltd., Los Angeles, Calif.

Trade Literature

Water Cooled Furnaces, a new 32-page bulletin, is being distributed by the Babcock & Wilcox Company. The bulletin discusses the functions of water cooling for boiler furnaces, describes and shows by appropriate illustrations interesting details of B&W water-cooled furnace constructions and varied typical applications. Copies may be had on request.

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Marine P. & I. Insurance
Its Genesis and Growth

By Captain Edward C. Holden
Mgr. Safety Department, United States P. & I. Agency

It was not until about the middle of the last century, less than one hundred years ago, that consideration was given to the insurable value of the lives of those who went down to the sea in ships.

At the beginning of 1855, the shipowner found himself in the position of having to carry one-fourth of his liability in respect to damage to other vessels and cargoes arising out of collision and a potential liability of fifteen pounds per registered ton in respect to loss of life and personal injury. (Parliament had arbitrarily decreed the £15 penalty due to seafarers not having been properly provided for in case of accident or disaster.)

There were some owners who were financially strong enough to stand the loss of a ship and its freight, but to be held for £15 per registered ton would have more than wiped out their entire fortune. They undertook to find some means of protecting and indemnifying themselves against their potential liabilities. Special studies of the subject were made, which resulted in the establishment of two shipowners' mutual P. and I. Clubs.

This was the beginning of what is now known as Protection and Indemnity Insurance. Since then many other P. & I. associations have been formed in England, all of them on a mutual basis.

Where there was no actual fault or privity, a shipowner was entitled by law to limit his liability to the value of the ship and freight, subject to the important exception that where such liability was incurred in respect to loss of life or personal injury to any passenger the value of the ship and freight was to be taken at not less than £15 per registered ton.

These are the essential elements in the policies today, but the relative importance of the different items has changed greatly. Today the collision liability is no longer the principal liability of the Clubs. Personal injury and illness claims, damage to docks, bridges and other stationary objects, which presented only a few small claims at that time, now are a serious factor.

In the early days the cargo underwriters did not endeavor to recoup their losses from the shipowners under the right of subrogration. However, it was not long before cargo claims were becoming serious, and in the 1880s the shipowners' mutuals were becoming Protection and Indemnity Associations. It is under the indemnity section of their rules that cargo liabilities are covered. It is at this time also that Negligence Clauses and Exceptions Clauses were inserted in charters and bills of lading.

The World War and Marine Insurance

The English P. & I. Clubs, as these associations are generally spoken of, and the Norwegian Skuld, constituted the world's market for P. & I. Insurance, and ships of every flag were enrolled in them. Until the World War these markets were the only ones available to American shipowners.

The advent of the World War made great changes in American foreign trade and our foreign shipping. During the first years of the war the United States was neutral and its citizens free to trade with whom they would. At the beginning of 1914 over 90 per cent of the imports and exports of this country were carried in foreign ships. When the war broke out, the ships of British and Allied nations were operated under orders of their respective governments and the ships of Germany and her Allies were interned, which left this country entirely dependent on its own resources for ships, except for trade with Great Britian and her allies.

Efforts were made to put American ships on every essential trade route. American ships were chartered even for voyages to Germany. During 1914, 1915, and 1916, the English Government in its conduct of the war issued regulations in re-

MARINE DEPARTMENT
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MATHEWS & LIVINGSTON
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spect to the conduct of marine insurance, including Protection and Indemnity Insurance, which made it necessary for the P. &. I. Clubs to prescribe rules and limit the activities of Companies insuring with them, and also they required considerable information with respect to cargoes carried in foreign trades.

These regulations required by the English Government were found by a number of American shipowners to be detrimental to their interests as neutrals, and created a demand for an American market in which American owners could secure Protection and Indemnity Insurance without subjecting themselves to the interference of foreign governments and foreign steamship owners.

Eventually a firm of brokers who handled a large amount of P. & I. insurance, and a group of their shipowner clients, secured a charter from the New York State Legislature to organize a Mutual P. & I. Association, which was formed in February, 1917, and was the first American P. & I. Club.

U. S. Government and Marine Insurance

America's entrance into the World War on April 6, 1917, came with suddenness and found this country totally unprepared to carry its overseas trade.

The United States Shipping Board promptly organized the greatest shipbuilding program that the world had ever known up to that time. It organized the Emergency Fleet Corporation to operate these ships.

Ships were built, put in commission and operated on the trade routes deemed essential. Some vessels were operated by the Emergency Fleet Corporation, some chartered to steamship companies, and some turned over to managing operators to handle.

At the end of this shipbuilding program the Government, acting through the Shipping Board, owned about 2400 ocean-going ships.

The Government then found it necessary to protect its best interests and those of the nation in certain marine insurance matters; accordingly the Shipping Board organized the United States P. & I. Agency which began to function February 20, 1923, and as of that date the Agency took the P. & I. insurance on all ships controlled by the Shipping Board.

Encouragement of Private Ownership

During the latter part of the '20s the United States Government adopted a policy of encouraging private industry. The Shipping Board actively endeavored to sell its vessels to private steamship companies; in line with this endeavor the Board decided to establish an active stock P. & I. market in this country.

At the request and invitation of the Shipping Board, the Marine Office of America made a proposal to purchase the United States P. & I. Agency, and after protracted negotiations the Shipping Board sold it to them on June 30, 1929. The companies constituting the Marine Office of America began writing this business on a strictly stock insurance basis. By that it meant giving a definite contract for a definite premium and without the assured being subjected to subsequent assessments.

Were it not for the sound and established American Marine Insurance Companies today, history would probably repeat itself, and the American Shipowners would again be at the mercy of certain foreign governments for insurance protection, as they were at the outbreak of the World War in 1914.

(Extract from paper read before the 28th National Safety Congress, Atlantic City, October 17, 1939.)

NEW FIRST AID KIT APPROVED

Notification has just been received by the B. F. McDonald Company, Los Angeles, that their new first aid Kanister Kit has been tested and approved for immediate use by the Bureau of Marine Inspection and Navigation.

The Kanister Kit consists of a drawn aluminum cylinder which is said to be dust proof, weatherproof and corrosion proof. The cylinder contains a canvas rollup, the pockets of which carry either a standard or any specified assortment of first aid materials. The cylinder is mounted on walls, in truck cabs, or at any convenient place by means of a special bracket. The base of the cylinder, which forms the opening, is removed by a thumb-and-finger release catch. Special advantages claimed for the Kanister Kit are that the kits may be placed anywhere, that their contents are kept free from contamination and adverse effects of weather and temperature, and are instantly accessible and easily serviced.

In reporting this approval, the Bureau stated the Kanister Kit showed no signs of wear or corrosion after thirty-five days of service, which included forty-nine hours of fog and fifteen days of exposure to salt water. No break-down of materials was found at zero or at fifty degrees Fahrenheit, and even at one hundred degrees Fahrenheit excellent service from materials was reported. A bulletin describing the Kanister Kit is available to interested parties.

Our illustration shows the marine terminal at the foot of Buchanan Street in San Francisco officially known as Peterson's Water Taxi . . . where small craft put in for supplies.

A feature of the terminal is the availability of the service at the dock or "in the stream," the latter by means of water "taxis" which make deliveries alongside.

The Texaco products are featured exclusively . . . including the well-known Texaco gasoline brands, lubricating oils, and other products.

Old Friend with a New Name

The Mariners Club of California Starts Functions

Pacific Marine Review is gratified to bring to its readers the important news that the former Propeller Club of California has elected to change its name . . . and we take pleasure in announcing that hereafter the organization will be titled the Mariners' Club of California.

We understand that the voting by the club's membership was overwhelmingly in favor of continuing the club . . . with a pronounced indication that the functions be continued along the lines of social get-togethers. The membership of the Mariners' Club of California is largely comprised of men who have been interested in the organization since its inception some ten years ago. Whereas a percentage of the votes favored the continuance of the club under its original name, the board of governors decided in the interest of avoiding confusion with the name of the National Propeller Club organization, now chartered at the Port of San Francisco, graciously to adopt the new title.

So it's a Happy Voyage to the Mariners! Let good fellowship reign . . . and let's all look forward to many happy events with our old shipmates.

● Gala Event

The first gala program to be staged under the new order of things . . . will be a luncheon meeting on Saturday, November 4th, in the roof garden of the Hotel Whitcomb in San Francisco.

The occasion will honor Charles J. McDonald, recently retired U. S. assistant inspector of boilers at San Francisco.

Fletcher Monson is acting as the official dynamo for the event and is piping aboard all hands for the well-planned celebration. One of San Francisco's leading "maritimers" is being selected as toastmaster. It is expected that a banner attendance will respond and one of those traditionally good times which this organization knows so well how to stage will be enjoyed.

● Navy Day Participation

The Mariners' Club of California is extending fine cooperation to Walter J. Walsh, chairman of the October events honoring Navy Day. Many of our members are working along with Chairman Walter . . . helping in the many details.

On October 22nd **Captain Cy Meek** acted as general "factotum" of the yacht races staged in the local harbor.

Captain L. M. Edelman officiated at the exercises held at the Golden Gate International Exposition by the Sea Scouts and high school participants.

The general exercises commemorating the Navy Day observances will be climaxed on Friday evening, November 10th. The crowning event will be the Navy Ball scheduled for the Fairmont Hotel.

● Appointments

Frank Fox has been appointed to fill a vacancy on the board of governors.

Another appointment of the month is that of **Joseph J. Coney** who has been named to the membership committee.

CAPT. B. B. HOWARD TO EXECUTIVE POST

News of the retirement of Robert F. Hand, vice president and general manager of the marine department, and a director of the Standard Oil Company of New Jersey, was received during the latter part of last month.

Mr. Hand has been succeeded by **Captain Bushrod B. Howard**, U. S. N. (retired), who was elected to that important post after serving with the company for a number of years in this country and Europe. For the last few years he was assistant to the late Robert L. Hague, and after the death of the latter was assistant to Mr. Hand.

PACIFIC MARINE *Reviews*

WALTER L. GREEN JOINS SEATTLE-TACOMA SHIPBLD.

John D. Reilly, president of Todd Shipyards Corporation, 1 Broadway, New York City, announces the appointment of **Walter L. Green** as vice president and general manager of the Seattle-Tacoma Shipbuilding Corporation, Pacific Coast affiliate of Todd Shipyards Corporation. Mr. Green took over his new post on October 1.

Mr. Green, who resigned as vice president of the American Bureau of Shipping to join the Todd organization, was born (July 8, 1894) in and received most of his education in New York, but curiously enough passed twenty-five years of his career in the shipping industry on the Pacific Coast. Following a special apprenticeship with the American Locomotive Co., Dunkirk, N. Y., he joined the Luckenbach Steamship Company in New York in 1913 as draftsman and assistant in their repair shop. He was transferred to Seattle in 1916.

With Luckenbach he served as draftsman, inspector, assistant to the superintending engineer, superintending engineer, and naval architect, until 1928, when he was appointed manager of the Engineering Department.

In April, 1938, he resigned to join the American Bureau of Shipping as vice president.

The Tacoma-Seattle Shipbuilding Corporation recently received an order from the Maritime Commission for the construction of five C-1 type motorships at a cost of $10,635,000.

R. J. Lamont is president of T.-S. S. C.; and J. A. McEachern, of the General Construction Company, is vice president.

Mr. Green is a member of the council of the American Society of Naval Architects and Marine Engineers, and a member of the American Society of Mechanical Engineers, the Institute of Marine Engineers, and the Northeast Coast Institution of Engineers and Shipbuilders.

Walter L. Green, Vice-President and General Manager of Seattle-Tacoma Shipyards Corporation, Pacific Coast affiliate of Todd Shipyards Corporation.

APPRECIATION

We have already noted in these columns the retirement of our good friend Capt. H. W. Rhodes, Superintendent of Lighthouses, 18th District, and we are glad to note and reprint the following finely-appreciative notice from the September Coast Guard Bulletin:

The retirement of Capt. H. W. Rhodes from active duty on June 30, 1939, concluded an active career of 40 years of service to the Government, which he entered in 1899 as an officer of the U. S. Coast and Geodetic Survey.

Terminating a notable career in that service, during which he commanded Coast Survey vessels in the Philippines, Hawaii, Panama Canal, Alaska, and elsewhere on the Atlantic and Pacific Coasts, Captain Rhodes was appointed Superintendent of Lighthouses (originally Inspector) in 1912, in charge of the 18th Lighthouse District, embracing the coast and waterways of California, with headquarters at San Francisco. He continued in that position until the date of his retirement, the senior field officer of the Lighthouse Service.

Captain Rhodes became widely known for his professional attainments in nautical, engineering, and scientific fields, and earned the unqualified respect and esteem of all with whom he was associated, both within the Government and among all maritime activities on the Pacific. He is a graduate of the University of California, and a member of the American Society of Civil Engineers

SEA SERVICE RECORD

Unique is the record of Gerrit Spykerman, chief night steward on Holland-American Line's steamer Rotterdam. He has recently completed his fiftieth year of continuous service at sea on the vessels of this line.

Born at Brockoplangendyk, North Holland, in 1870, Spykerman went to sea in the Obdam in 1889. During the intervening years, he has spent comparatively few days on land and has traveled over four million miles by water.

On his completion of 300 round trips in 1926, he was presented with a bronze medal and dubbed a knight in the order of Orange Nassau by Her Majesty Queen Wilhelmina, of the Netherlands.

During the recent cruise of S. S. Rotterdam to South America, the passengers and crew gave Sypkerman a great ovation on his fiftieth anniversary and presented him with a purse.

CAPT. T. F. SHEEHAN

Capt. T. F. Sheehan, Northwest manager for Swayne & Hoyt, Inc., underwent a serious operation on October 12 at a Seattle hospital. . . . He is reported to be making rapid progress toward recovery. . . . Captain Sheehan's host of friends in Pacific shipping circles wish him a speedy return to good health.

PACIFIC TRAFFIC DINNER

John Havanan of the Furness Line is chairman of the steamship committee now arranging for Annual Steamship Night of the Pacific Traffic Association of San Francisco to be held on November 14 at the Elks Club. . . . Working on the program are Frank Herberth, American - Hawaiian Steamship Co.; Charles Reali, General Steamship Corporation; Gordon Rowley, McCormick Steamship Company; Robert Pyke, Johnson Line; Gene Hurst, Matson Line; Cecil Rowley, Sudden & Christenson; Captain C. L. Meek, Bay Cities Transportation Company; Ed Murphy, Hammond Shipping Company; and William Gleason, McCormick Steamship Company. . . . Ed Murphy is developing the most elaborate entertainment features ever contrived.

CHANGE IN NAME

Lillick, Geary, Olson & Charles is the new name of the well-known admiralty law firm formerly known as Lillick, Olson, Levy and Geary. . . . Offices of the company remain at 311 California Street in San Francisco. . . . Los Angeles business of the associates will be continued under the firm name of Lillick, Geary, McHose & Adams, with offices at 634 South Spring Street. . . . Associated in the two offices are Messrs. Ira S. Lillick, Joseph J. Geary, Allen E. Charles, James L. Adams, John C. McHose, J. Arthur Olson and Gilbert C. Wheat.

WATER TRANSPORT

Arthur B. Poole, vice-president and treasurer of the American President Lines, has been elected to the faculty of Stanford University by the board of trustees, to serve in the capacity of consulting professor on water transportation. . . . Poole is a graduate of the University of Minnesota and the Harvard Business School.

PORT OF OAKLAND

John McLaverty, Jr., was chairman of the day for the fourth annual Port of Oakland Day Luncheon held at the Outer Harbor Terminal on October 19. . . . Harold R. Breakenridge, president of the Oakland Junior Chamber of Commerce, presided. . . . Speakers were William J. McCracken, mayor of Oakland; James J. McElroy, president of the Board of Port Commissioners; and James Mussatti, general manager of the California State Chamber of Commerce.

PUGET SOUND TO ORIENT

Bryce Little, counsel for the trustee of the American Mail Line, Ltd., announces resumption of operation of the fleet between Puget Sound and Orient for December 1. . . . It is reported that Federal court confirmation of the line's financial reorganization plans and approval of the sale of the steamer President Madison for $350,000 terminated months of planning by creditors and company officials. Philippine interests are buying the ship and the funds will be used for working capital. . . . Either the line's four remaining vessels or tonnage supplied by the U. S. Maritime Commission will be used in the revival of service. . . . **H. E. Warner** was appointed trustee by court order, along with a board of nine directors, eight of whom are Seattle business leaders. . . . The line suspended operations to the Orient in 1938.

J. F. McCONKEY AWARD

J. F. McConkey, district manager of the Sperry Gyroscope Co., Inc., whose headquarters are in San Francisco, donated a beatutiful trophy for the yacht racing program held on San Francisco Bay in connection with observance of Navy Day on October 27. . . . The award was to the winning naval officer in the bird boat race off the Marina.

LONG BEACH SELECTED

E. J. Amar of Los Angeles was elected to the post of second vice-president of the American Association of Port Authorities at the convention recently held in Milwaukee. . . . The City of Long Beach was selected for the 1940 convention. . . . The recent gathering of the Pacific Coast Association of Port Authorities in Oakland this year also chose Long Beach for the 1940 meeting.

NEW YORK TRIP

Lloyd Swayne and **Tirey L. Ford,** president, and executive vice-president respectively, of the firm of Swayne & Hoyt, Ltd., were recently in New York on a business trip.

MATSON LINE SIGN

Sydney G. Walton, general passenger traffic manager for the Matson Line, with headquarters in San Francisco, on October 26th pressed the button turning on the giant new neon sign atop the Matson Building. . . . The sign's huge lettering proclaims "Matson Line" and its dimensions are 108 feet by 10 feet. . . . This specatcular illumination faces the waterfront and all on the Bay Bridge will see it in prominent display.

NORTHWEST COAST GUARD

Lieutenant D. B. McDiarmid is en route to Port Angeles, Wash., to assume temporary command of the Coast Guard station there during the absence of **Lieutenant Commander N. M. Nelson,** according to word from **Captain M. P. Munter,** in charge of the Seattle division.

JAMES REILLY PASSES

James Reilly, widely known in Westchester and Upper New York State, died early last month in his home at Yonkers. . . . He was the father of **John D. Reilly,** president of Todd Shipyards Corporation. . . . Only a few days before his passing Mr. and Mrs. Reilly had celebrated their 52nd wedding anniversary at the family home.

HUENEME T. M.

The Port of Hueneme announces the appointment of **R. R. MacKenzie** as traffic manager.

Mr. MacKenzie has had a wide experience in transportation, having been associated with industries, railroads, highway carriers and steamship lines. He is widely known in Pacific Coast transportation circles.

Fork Type 3-Ton Tiering Truck

A new, compactly built model truck of the center control fork type is the Elwell-Parker F-16, rated 6000 pounds, built by the Elwell-Parker Electric Company, Cleveland, Ohio. This truck is a companion type for a similarly rated truck, but with rear end control, formerly described in these pages.

The F-16 is built either as a telescoping or non-telescoping truck for inside car work or high tiering of pallet loads in warehouse. It may be fitted with a fork of two prongs to be thrust beneath metal or wood load-carrying pallets or with a single or double ram for insertion in coils or circular ring type packages or unit loads. Forks and rams are made of various lengths and spacings to accommodate loads.

The operator's station amidship affords him unobstructed vision of the fork tips when load is being picked up or placed, and contributes more to his safety, without increasing the important turning radius, as when similarly adequate protection is provided by a structure behind operator at the rear of the truck.

The frame is a box-like formed plate all welded structure with fixed full-floating axle and non-steered wheels fitted with solid rubber tires.

Enclosed drive motor is mounted on axle driving through spiral and spur gears on anti-friction bearings, all carried and adjusted in differential pot cover.

A new type of trail or rear axle carries frame on a spring system providing for a third-point support, which assures floor contact not only for the two trail wheels but for the two drive wheels ahead, and provides against and from strains. The trail axle wheels, each fitted with two solid rubber tires, are steered at sharp angles, rotating the rear end of truck about one or the other drive wheel.

The fork carriage hoist and upright or mast tilt units are mounted ahead of the operator. The former lifts fork carriage by means of heavy double sprocket chains, while the latter rocks the uprights backward by means of two toothed racks for safety of load when traveling, and forward for load pick-up on uneven floors.

Fork hoist is fitted with slip clutch for protection against excessive overloads or accidental thrust of load forks under immovable loads, while an overrun ratchet device protects hoist and chains if load forks are lowered against obstruction. In addition an electro-mechanical brake holds the load at will of operator, and hoist generator motor is designed to provide for regenerative function of returning electric current to battery when lowering loads from stacks.

The F-16 truck is of compact design and has perfect balance, yet all parts are readily accessible, and counterweighting has been kept to a minimum to provide for operation on elevators.

Protection Against Fumes and Gases

Announcement was made recently by American Optical Company of the development of 3 new chemical cartridges, which are quickly and easily interchangeable with the standard Type A dust cartridge now being supplied for the American R1000 respirator put on the market last year.

This one unique respirator, therefore, can now be secured with a range of four protective filters, each providing highly efficient protection against Type A dusts or non-lethal concentrations of certain fumes and vapors.

One of the new chemical cartridges is designed for use against low concentrations of fumes and gases encountered in paint spraying, and other light organic vapors. If desired, a protective cover can be supplied to retard plugging when the respirator is used in paint spraying. The second cartridge can be used against low concentrations of acid gases, and the third against low concentrations of acid organic gases.

All three of the cartridges are alike in construction, differing only in the filtering element. They are long-lived, and thoroughly tested for uniform packing and high efficiency. A specially designed separator on the inlet side permits full use of the entire absorption medium. The wearer breathes easily and is not subjected to objectionable odor.

Visible Flow Pipe Fitting

Many applications for a visible-flow fitting are found in power plants and process industries to provide continuous checks on operation of equipment and to observe the fluid in flow under pressures up to 125 lbs. per square inch.

Developed by Cochrane Corporation to facilitate the observation of the duration of the blow-off from hot process softener sedimentation tanks, the closed fitting equipped with sight glasses is advantageous in that it permits discharge of the sludge to the sewer under pressure, as well as permitting a smaller line than would be necessary with gravity flow from an open funnel, as is the usual custom.

The Cochrane Sight Glass has been designed in six sizes for 2½, 3, 4, 5, 6, and 8 in. lines for any purpose where visual inspection of fluid flow is desired. Body is of cast iron and the window frame is of steel. Windows are made of Pyrex glass. The Sight Glass fitting is flanged for installation in the line and all sizes measure 13¼ in. between finished surfaces. Windows are 4¼ in. in diameter for all sizes. Weights range from 45 to 215 lb.

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Frazer A. Bailey
First Vice-President
Charles L. Wheeler
Second Vice-President
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First Program is Scheduled

November 7th will mark the first official luncheon of the Port of San Francisco Chapter of the National Propeller Club of the United States. The house committee has located the initial event in the Palace Hotel.

Guest speaker for the day will be H. C. Cantelow, whose subject will be "Charting the Course" . . . a discussion of ways and means of improving the terminal situation.

Mr. Cantelow is well-versed in his subject and members can look forward to a fresh and most interesting viewpoint on this important topic . . . a viewpoint which will undoubtedly prove interesting to everybody associated with water-borne commerce.

Mr. Cantelow's ship-operating background dates back to the days of the old Pacific Coast Steamship Company. He now occupies the important post of chairman of the Pacific Coastwise Conference. He is also president of the Marine Terminal Operators Association of Central California.

At this Tuesday luncheon members will enjoy a special entertainment feature which is now being planned by the committe. It is urged that all members come aboard for the event. Guests of members will be welcomed. Undoubtedly the audience in attendance will receive much profit from this informative talk.

Gentlemen of the Port of San Francisco . . . you have a date at the Palace Hotel for Tuesday, November 7th!

● AMM Meet Success

Word comes through from our executive officers in attendance at the American Merchant Marine Conference in New York this month of a very successful meeting. Through the kindness of Honorary President Arthur Tode, we are presenting a photograph of the official banquet. Among those present are several of our San Francisco shipping executives . . . President Tirey L. Ford, Vice President Joseph R. Sheehan, Vice President Frazier Bailey among others.

● Programs to Be Monthly

With the inauguration of the luncheon programs on November 7th, the club will schedule a monthly meeting hereafter. Big plans are in the offing for the December meet . . . details of which will reach the members in due course through the good offices of Gene Hoffman, executive secretary.

American Merchant Marine Meet
Attracts National Interest

The propeller Club of the United States concluded its Thirteenth Annual Convention on October 10, with an Annual Banquet attended by 1500 shipping leaders and their ladies from all sections of the United States.

Arthur M. Tode, honorary president of the Propeller Club of the United States, served as toastmaster and introduced the speakers of the evening, who were:

Charles H. C. Pearsall, national president, The Propeller Club of the United States; **Rear Admiral Emory S. Land, USN, Rtd.**, chairman, United States Maritime Commission; **Honorable Paul V. McNutt**, Federal Security Administrator.

On the dais, reading from left to right:

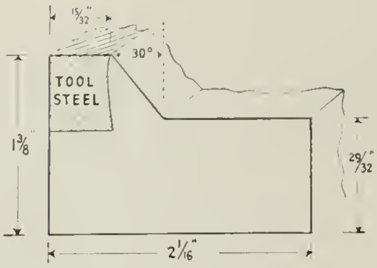
Lower dais: Reverend Harold H. Kelley, The Seamen's Church Institute of New York; C. J. Pannill, president, Radiomarine Corporation of America; Commander R. S. Field, director, Bureau of Marine Inspection and Navigation; Mrs. Arthur H. Fletcher, president, The Women's Organization for the American Merchant Marine, Inc.; M. J. Hanlon, vice president, The Propeller Club, Port of New York; Frank J. Taylor, president, American Merchant Marine Institute, Inc.; Honorable Paul V. McNutt, Federal Security Administrator; Commander Robert C. Lee, USN, Rtd., president, Propeller Club, Port of New York; J. Lewis Luckenbach, chairman, American Merchant Marine Conference Committee; Rear Admiral Emory S. Land, chairman, United States Maritime Commission; Charles H. C. Pearsall, national president, The Propeller Club of the United States; Arthur M.

(Continued on page 59)

Composite Die Sections

A new die section, designated as Section "D," has just been added to their line of rolled composite die section shapes by the Jessop Steel Co. Section "D," as shown in illustration, was developed for making smaller dies used in the manufacture of toys, refrigerators, containers and other articles where composite die sections of smaller size than hitherto available were needed. Weight per foot of new section is 7.25 lbs.

Jessop rolled composite die sections, which are now available in eight shapes, consist of a tool steel cutting edge backed by non-hardenable soft steel. Principal advantage over solid tool steel sections lies in the fact that they may be hardened before drilling dowel holes, thus eliminating expensive lapping operations and assuring a good fit of sections on holder. Composite sections may also be hardened to a slightly higher degree than solid tool steel, because the tough soft steel backing "cushions" the shock in cutting; also, any slight warpage which takes place during heat treatment of the composite section may be readily corrected on a pusher type straightening machine, whereas a hardened tool steel section might break.

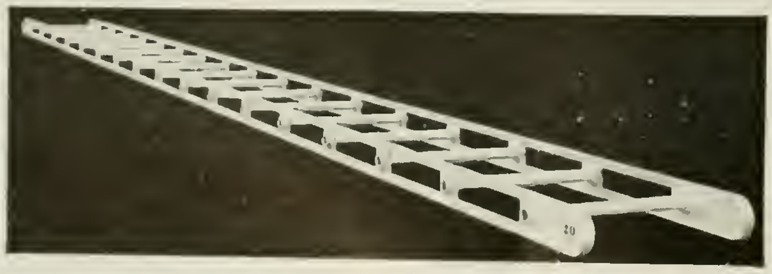


Because Jessop composite die sections are rolled rather than forged they may be produced in longer lengths, which reduces set-up time on machines as well as machining time. Being rolled to shape, they save from 28 per cent to 47 per cent, depending on the section, in machining and original purchase weight, as compared to rectangular sections.

Jessop rolled composite die sections may be formed either hot or cold to special shapes without harm to the weld, since practical tests have proved that the weld is as strong as or stronger than the component parts. These sections are now being used in dies for auto bodies, stoves, refrigerator panels, aeroplane metal sheet shapes, railroad cars, truck bodies and other products, where sheet metals are to be cut to regular or irregular shapes.

New Light-Weight Ship Ladders

A new aluminum ladder especially adapted for marine service has just been developed by the Aluminum Ladder Co. Constructed from strong, light aluminum alloy throughout, these ladders will not warp, dry out, rust, rot or deteriorate in any way—even though exposed to the severest weather conditions. Ladders intended for use on seagoing vessels are given a special protective coating that enables them to resist salt water corrosion for many years.



Aluminum ladders weigh only half as much as ordinary ladders, yet are twice as strong. The twenty-foot, single type ladder illustrated weighs only 29 lbs.; a thirty-foot ladder of the same type weighs only 65 lbs. Due to their light weight, aluminum ladders may be quickly moved about, increasing the efficiency of workmen, and their greater strength enables them to carry heavy loads without breaking. Additional safety features are the absence of splinters and sharp edges, which might cause infection, and the fact that aluminum ladders bend warningly, rather than snap suddenly, when overloaded.

The new ladder for marine service has rounded ends at top and bottom, as illustrated; however, standard safety shoes or steel spikes are furnished at bottom, if desired. It is available in lengths up to 36 ft. Width vary from 18 in. for the shorter ladders up to 24 in. for the longer ones.

Corrosion Resistant Coatings

D. W. Haering and Company has developed a new line of corrosion resistant coatings for external application to metal surfaces for protection from corrosion. This line of products introduces the famous organic corrosion inhibitors, developed by Haering Research, suspended in non-drying bases for protection from atmospheric and sub-soil corrosive conditions.

Identified under the trade name IN-HIB-CO, these products introduce the chrom glucosate compounds for corrosive control to new fields of use. These products are prepared in several forms to meet varying temperature requirements, and may be applied by brushing, spreading or spraying on exposed surfaces. The films formed are resistant to moisture, and contain sufficient film inhibitor to protect underlying surfaces from corrosion for an indeterminate period of time.

Small quantities cover large surfaces, one pound of the average product covering one thousand square feet of surface and providing positive protection from corrosion.

National Propellers Climax AMM Conference At Banquet

AMM Meet

(Continued from page 57)

Tode, honorary president, The Propeller Club of the United States; Rear Admiral C. H. Woodward, U.S.N., Commandant, Third Naval District; Colonel J. Monroe Johnson, Assistant Secretary of Commerce; Rear Admiral R. R. Waesche, U.S.C.G., Commandant, United States Coast Guard; Rear Admiral Frank R. Lackey, N.M. N.Y., New York State Naval Militia; H. W. Parsons, past national president, The Propeller Club of the United States; H. J. Harding, national secretary, The Propeller Club of the United States; J. H. Godwin, national treasurer, The Propeller Club of the United States.

Upper dais: David Livingstone, Los Angeles Chamber of Commerce; S. D. McComb, United States P. & I. Agency; L. B. Pate, Mississippi Shipping Company; Gilbert Johnson, Lake Carriers' Association; Captain O. Slack Barrett, Mississippi River System Carriers' Association; Colonel Alvin B. Barber, United States Chamber of Commerce; Professor Alfred A. Haag, United States Maritime Commission; John F. Gehan, American Export Lines; Earl Thacker, Thacker Transportation Company, Honolulu, T.H.; Byron O. Pickard, Waterfront Employers' Association of the Pacific Coast; Professor Philip Taft, Brown University.

New National President

Captain Thomas A. Scott, well known here and abroad in marine circles for many years, recently elected National President of the Propeller Club of the United States at its annual convention held at the Waldorf-Astoria Hotel in New York early in October, brings many years of experience and a wealth of knowledge of marine affairs with him when he enters upon his new duties. Captain Scott's life has always been associated with the sea and ships.

Upon his graduation from the Mystic Valley Institute in the late 90's he immediately entered the employ of his father, Thomas A. Scott, Sr., who was in his own right a notable figure along the Atlantic Coast. F. Hopkinson Smith, the writer, patterned his fictional character, Caleb West, Master Diver, after the senior Captain Scott.

Captain Scott Jr.'s career has been as interesting as it has been varied, yet each activity has pointed toward the position he now holds. He was first a blacksmith's helper and then in succession, and rather quick succession, too, he was sailor, captain, salvage officer and manager with the result that he was elected president of T. A. Scott Company when that organization was formed in 1903.

In December, 1922, Captain Scott was instrumental in bringing about the merger of Merritt & Chapman Derrick and Wrecking Company and his own T. A. Scott Company to form the now well known Merritt-Chapman & Scott Corporation. He was elected the first president of the new organization. Several years ago Captain Scott was made chairman of the board of the company and now directs the widespread activities of Merritt-Chapman & Scott both at home and abroad.

In addition to the Propeller Club of the United States, Captain Scott belongs to the Thames (New London), Engineers, India House, Whitehall, Bell and Brooklyn Clubs.

He is a director of Merritt-Chapman & Scott Corporation, Scott Investment Company, the Electric Boat Company, Merritt-Chapman-Lindsay, Ltd., and the American Construction Company.

Captain Scott is also a member of the board of managers, Seaman's Church Institute of New York City.

Capt. Thos. A. Scott

New Mercury Lamp Searchlight

A new type searchlight, using the small capillary water-cooled mercury lamps and producing a beam of more than 25 million candlepower, has been developed by General Electric engineers, it was announced on October 23 by the company. Three of the high-pressure lamps, each rated at 1000 watts and no larger than a cigarette in size, are mounted close together within a regulation searchlight. Whereas the carbon arc, the source of light in present-day searchlights, requires an attendant to adjust and replace the carbons, the mercury light with its automatic cooling and ventilating unit will function by itself. This offers many advantages, especially where it is desired to install lights not easily accessible. This new lamp should replace the plain carbon arc for searchlight use, but will still be below the present high-intensity searchlight in beam candlepower and effectiveness.

Despite the enormous candlepower produced, the new searchlights generate very little heat. Ninety gallons of water per hour is pumped through the cooling jackets of the lamps, removing more than 70 per cent of the heat. The cooling system, mounted in a small box beneath the searchlight, removes the heat from the water much after the fashion of an automobile radiator, and feeds it back through the lamp jackets. Control equipment is also contained in the box, and the lights can be started automatically on a prearranged schedule with the aid of an astronomic time switch. A flow switch mounted in the water line shuts off the electric current on the lamps should the water supply fail. Failure of one lamp in no way affects the operation or requires the shutting down of the remaining two.

Air Release Valves For Liquid Pipe Lines

A new line of air release valves is announced by the V. D. Anderson Company of Cleveland, Ohio. These valves automatically rid pipe lines and other closed vessels of entrained air or any other gas. The line includes three different styles of air release valves. First, the standard Silvertop is made in six sizes (see cut) from ½" to 2", inclusive, for pressures up to 250 pounds per square inch. Second, the forged steel Silvertop, for use on high pressures up to 1,000 pounds per square inch. These are made in three sizes with pipe connections of ½", ¾", 1", 1¼", 1½" and 2". Third, the Anderson No. "0", the original air release valve, is made in the ¾" size only, for a maximum pressure of 150 pounds per square inch.

As shown in the accompanying drawing, the Anderson Air Release Valve consists of a valve and seat, a lever and a ball foat inside of a case. The inlet is at the bottom and the air vent is at the top. The liquid raises the float and holds the valve closed. An accumulation of air or gas lowers the liquid level, causing the float to drop. This opens the valve and vents the air or gas.

In operation, Anderson Air Release Valves are placed at the high points in the pipe line, where the accumulations of air are automatically vented, eliminating air-binding.

Applications for the air release valve are hot water heating systems, brine lines, water mains, and other liquid lines and tanks under pressure.

Trade Literature

Oil Hose for Cargo Handling, a four-page catalog section just published by The B. F. Goodrich Company, Akron, Ohio, is now available.

This type hose is used in refineries and distributing terminals, on oil tankers and barges, for loading and unloading oil cargoes and to conduct oil and gasoline from sea lines to tankers, as well as pontoon work and many other services where flexible connections are necessary.

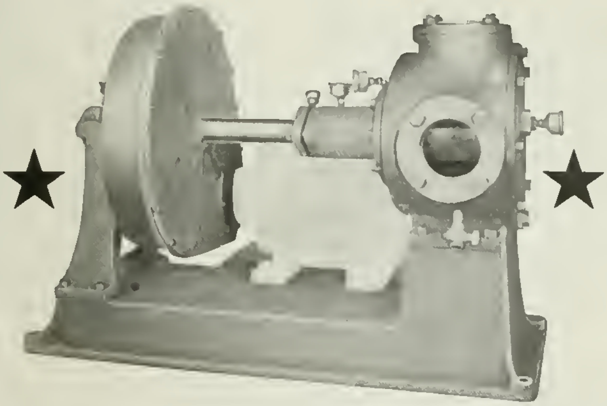
The catalog section describes four types of Goodrich dock loading hose, three types of barge loading hose, and one of sea loading hose, as well as fittings and suggestions on just what equipment to use in various services.

One of the features is approximate data on each type of hose, including number of plies, net weight pounds per foot without fittings, and outside diameter.

Elastic Stop Nuts, the 1939 Catalog and Data Book of Elastic Stop Nut Corporation, is now ready for distribution. This 56-page book explains graphically the Elastic Stop principle, whereby the nut is locked to the bolt through the action of a resilient non-metallic collar which eliminates all thread play between nut and bolt.

Contained also are comparative test data, suggestions as to where Elastic Stop Nuts can be used to advantage, numerous illustrations of applications in various industries, and a complete listing of the standard nuts available.

No Price Increase on Viking Pumps



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Viking STILL believes that the best way to sell more pumps is to build better pumps. The more than 800,000 Viking Rotary Pumps which have been placed in practically every type of industry during the past 28 years are Viking's most effective salesmen. In their performance is proof.

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Direct Reports from Yards as of October 1, 1939

Pacific Coast

BETHLEHEM STEEL COMPANY, INC.

Shipbuilding Division
(Union Plant)
San Francisco

NEW CONSTRUCTION:

Five C-1 cargo vessels for U. S. Maritime Commission. Full scantling steam propulsion type.

DRYDOCK AND ROUTINE REPAIRS: President Taft, Monterey, Union Oil Barge 1923, Chipana, W. S. Rheem, Curaca, President Cleveland, Admiral Cole, Shell Oil Co. Barge No. 6, Point Judith.

COMMERCIAL IRON WORKS

412 Southeast Stephens St.
Portland, Ore.

NEW CONSTRUCTION:

One 35-ton crane all-welded steel whirley derrick barge; 120′ x 44′ x 9′; for U. S. Engineers, Bonneville, Ore.

One twin screw tunnel all-welded stern towboat; 2500 H.P.; 93′ x 25′ x 6′.

One 200,000 gal. capacity all-welded oil barge; 144′ x 35′ x 8′.

One 15-ton whirley derrick barge, all-welded; 93′ x 40′ x 6′.

DRYDOCK AND ROUTINE REPAIRS: U. S. E. dredge Pacific.

FELLOWS & STEWART, INC.

Wilmington, Calif.

DRYDOCK AND ROUTINE REPAIRS: Purse seiners Bessemer and Western Spirit; fishing boats Norconian III and Sport Fisher; Torqua, dredge tender Jean, tug Vivo; power yachts Miss California, Pasada Manana, Blue Moon, Seyelyn II and Melinda; sailing yachts L'Apache, Zahma and Gipsy Girl; 47 small pleasure and commercial craft.

GENERAL ENGINEERING & DRY DOCK CO.

Foot of Fifth Avenue
Oakland, Calif.

NEW CONSTRUCTION:

Hull No. 38, one derrick barge for San Francisco Bridge Co.; wood hull; 75′ x 39′ 10″ x 8′ 3½″.

DRYDOCK AND ROUTINE REPAIRS: M.S. Hawaiian Standard, Lumberman, Capt. A. F. Lucas, Gas S. Mana, Carfloat No. 1, Barbara C., Noyo, Ryder Hanify, Standard No. 1, Esther Johnson, Davenport, Lumbertown.

HARBOR BOAT BUILDING CO.

Berth 264, Fish Harbor
Terminal Island, Calif.

NEW CONSTRUCTION

Madeirense, tuna bait fishing vessel 125′ x 28′ x 14′: 500 gross tons; for Madeirense Inc., San Diego, Calif. 600 H.P. Fairbanks Morse main diesel engine; 3 auxiliaries, 450 total H.P.; 12 knots speed; cost $185,000; quick freezing refrigeration. Launching date, November, 1939; delivery date, January, 1940.

HONOLULU IRON WORKS

Honolulu, T. H.

DRYDOCK AND ROUTINE REPAIRS: Lurline, yacht Stranger, tugs Mamo and Mikiala, M.S. Aorangi and Trade Wind, U.S.S. Tiger.

LAKE UNION DRY DOCK & MACHINE WORKS

Fairview and Galer Sts.
Seattle, Wash.

NEW CONSTRUCTION:

One stern wheel steam snagboat, Preston, for U. S. Engineer Dept. Delivery date November 15, 1939.

DRYDOCK AND ROUTINE REPAIRS: U.S.M.S. Northland and North Star; motorships Northland, Lincoln, Sea Boy, Chimacum, Taku, Snoqualmie and Dorothea; U.S.M.S. Boxer; U.S.C.G.C. Haida; Skagit Chief.

LAKE WASHINGTON SHIPYARDS

Houghton, Wash.

NEW CONSTRUCTION: 200 foot steam geared turbine steel survey ship Explorer for U. S. Coast & Geodetic Survey. Launching date, October 14, 1939; estimated delivery date, January 1, 1940.

LOS ANGELES SHIPBUILDING & DRY DOCK CORP.

Los Angeles Harbor
San Pedro, Calif.

DRYDOCK AND ROUTINE REPAIRS: U.S.C.G. patrol boat Perseus, tug John N. Stewart, La Brea, M.S. Eidsvold, Deroche, yacht Volador, M.S. Bradford City, Horace Luckenbach, Topila, Edwin B. De Golia.

MARE ISLAND NAVY YARD

Mare Island, Calif.

NEW CONSTRUCTION:

Tuna, submarine (SS203); keel laid July 19, 1939.

Gudgeon, submarine (SS211); order received for construction on June 2, 1939.

Fulton, submarine tender (AS11); keel laid July 19, 1939.

Order received for construction of one covered lighter (YF-259), dated June 30, 1939.

Order received for construction of two fuel oil barges (Y044 and Y045), dated July 11, 1939.

DRYDOCK AND ROUTINE REPAIRS: Philadelphia, Cincinnati, Blue, Mugford, Ralph Talbot, Patterson, Jarvis, Humphreys, King, Pelican, Rail, Selfridge, Arctic, Antares, Beaver, Pollack.

THE MOORE DRY DOCK CO.

Oakland, Calif.

NEW CONSTRUCTION:

Hulls Nos. 195, Sea Arrow, and 196, two cargo vessels for U. S. Maritime Commission; LOA 492′ 0″, LBP 465′, breadth molded 69′ 6″, depth molded 42′ 6″, SHP normal 8500, SHP max. 9350, dis. 17,600 tons, deadweight 11,926 tons; steam turbine propelled. No. 195, keel laid March 18, 1939; launched September 15, 1939. No. 196, keel laid September 19, 1939.

DRYDOCK AND ROUTINE REPAIRS: Oregonian, Puerto Rican, Florence Luckenbach, Iowan, Point Brava, Columbian, W. H. Berg, Point Judith, Silverwillow, Claremont, Andrea Luckenbach, Charles Christenson, Thorhild, Utahan, Tosari, Lancaster, Alabaman, Katrina Luckenbach, Point Bonita, purse seiner Western Traveler, Cuzco, W. S. Miller, Steel Worker, Silversandle, City of Roubaix, Yerba Buena, Pennsylvania, Disa, Santa Fe Barge No. 6, Heranger, Nordvest, Knoxville City.

THE PUGET SOUND NAVY YARD

Bremerton, Washington

NEW CONSTRUCTION:

Charles F. Hughes (Destroyer No. 428); standard displacement 1600 tons; order placed by Navy Department December 7, 1937. Keel laid January 3, 1939.

Monssen (DD436); keel laid July 12, 1939.

Woban (YT138); keel laid September 23, 1939.

Ala (YT139); keel laid September 23, 1939.

Ships authorized, work not started: Barnegat (AVP10), seaplane tender; Biscayne (AVP11), seaplane tender; Casco (AVP12), seaplane tender; Mackinac (AVP13), seaplane tender.

DRYDOCK AND ROUTINE REPAIRS: Minneapolis, Astoria, West Virginia, Houston, Colorado, Lexington, Patoka, Yorktown, Brooklyn.

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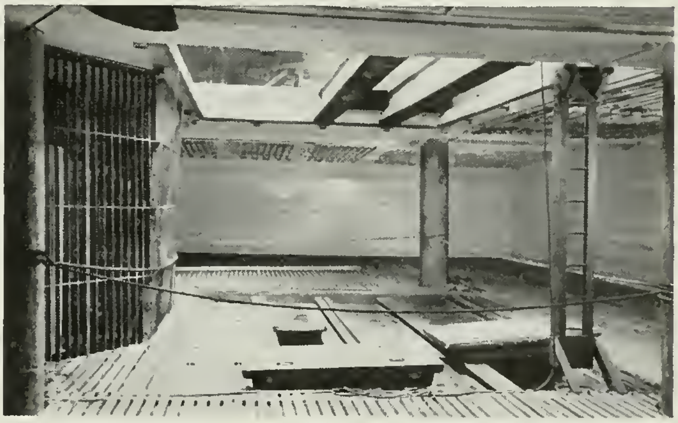

Marine Insulation by MUNDET

LOW TEMPERATURE
For all refrigeration requirements be sure to have the protection of Mundet "Jointite" Corkboard and Moulded Cork Pipe Covering. This low temperature insulation gives dependable protection against heat infiltration. Economical, long-lasting, it is most adaptable to individual requirements. Our engineering staff will be glad to help with specifications.

HIGH TEMPERATURE
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WESTERN BOAT BUILDING CO., INC.
2505 East 11th Street
Tacoma, Wash.

NEW CONSTRUCTION:

Hull No. 140, purse seine fishing vessel, 81′ x 21′ x 11′; 220 H. P. Atlas Diesel engine. **Launching date, October 20,** 1939; **delivery date, November 30, 1939.**

Hull No. 141, purse seine fishing vessel: **keel laid November 1, 1939.**

DRYDOCK AND ROUTINE REPAIRS: **Tug Tango; fishing boats Flying Fish and Reliance.**

Atlantic, Lakes, Rivers

AMERICAN BRIDGE COMPANY
Pittsburgh, Pa.

NEW CONSTRUCTION:

One relay barge 104′ x 34′ x 8′ for the Panama Canal. Delivery date January 1, 1940.

Three double deck covered barges 198′ x 35′ x 11′ for Mississippi Barge Line Co., St. Louis, Mo.

Ten cargo barges 175′ x 26′ x 1′ for stock.

BATH IRON WORKS
Bath, Maine

NEW CONSTRUCTION:

Hulls Nos. 177 and 178, DD423 and DD424, two 1620-ton destroyers for U. S. Navy. Contract date September 30, 1937; delivery dates April and June, 1940, respectively.

Hulls Nos. 180-181, DD429 and DD430; two 1620 ton destroyers for U. S. Navy. Contract dated August 15, 1938; delivery dates, December, 1940, and February, 1941, respectively.

Hulls Nos. 182-183, DD437 and DD438, two **1620-ton** destroyers for U. S. Navy. Contracts dated June 15, 1939. Delivery dates June 15, 1941, and August 15, 1941.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Fore River Yard
Quincy, Mass.

NEW CONSTRUCTION:

CV7, Wasp, Airplane Carrier for U. S. Government; keel laid April 1, 1936; launched April 4, 1939.

Hulls Nos. 1470 and 1471, two 1500-ton destroyers for U. S. Government: delivery dates March, 1940 and May, 1940.

Hulls Nos. 1474, 1475, 1476 and 1477, four freight vessels for American Export Lines, Inc.; 450′ B.P. x 66′ x 42′3″; 16½ knots: geared turbines and water tube boilers. Keels laid, No. 1474, November 10, 1938; No. 1475, December 16, 1938; No. 1476, March 16, 1939; No. 1477, July 27, 1939 Launching dates, No. 1474, July 18, 1939: No. 1475, September 16, 1939.

Hull No. 1478, Massachusetts; 35,000 ton battleship for U. S. Navy.

Hulls Nos. 1479 and 1480, two 6000-ton cruisers for U. S. Government.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Sparrows Point Yard
Sparrows Point, Md.

NEW CONSTRUCTION:

Hulls Nos. 4329, Platte; 4330, Esso Annapolis; 4331; three 16,300 dwt. ton tankers for Standard Oil Co. of N. J.; 18 knots speed. Contract signed January 3, 1938. No. 4329 launched July 8, 1939. No. 4330, keel laid December 21, 1938: launched September 9, 1939. No. 4331, keel laid September 18, 1939.

Hulls Nos. 4337, Delbrazil; No. 4338, Deltargentino; and No. 4339, Delorleans; three passenger and cargo ships for Mississippi Shipping Co. Contract signed December 21, 1938. Keels laid, No. 4337, April 10, 1939; No. 4338, May 8, 1939. Launching date, No. 4337, December 16, 1939. Delivery dates, No. 4337, June 1, 1940; No. 4338, September 1, 1940; No. 4339, December 1, 1940.

Hull No. 4340, tanker for Union Oil Co. of Calif. Contract signed May 1, 1939. Keel laid July 18, 1939.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Staten Island Yard
Staten Island, N. Y.

NEW CONSTRUCTION:

Hulls Nos. 8001, Navajo; 8002, Seminole; and 8003, Cherokee—three U. S. Navy fleet tugs. No. 8001, keel laying date December 12, 1938; launched August 17, 1939; delivery date January 1, 1940. No. 8002, keel laying date December 16, 1938; launched September 15, 1939: delivery date March 1, 1940. No. 8003, keel laying date December 23, 1938; **launching date November 10, 1939;** delivery date May 1, 1940.

Hulls Nos. 8015-8019, five cargo vessels, C-1-B design, for U. S. Maritime Commission. Length O.A. 417′ 9″, breadth 60′ 0″, depth 37′ 5″. Keel laying dates March 1, April 1, July 1, October 15 and December 15, 1940, respectively. Launching dates October 1 and December 1, 1940; and April 1, July 1 and September 1, 1941, respectively. Delivery dates April 1, June 1, August 1, November 1, 1941; and January 1, 1942, respectively. All above dates tentative.

BROOKLYN NAVY YARD
Brooklyn, N. Y.

NEW CONSTRUCTION:

CL 50, Helena, light cruiser; L.B.P. 600′ beam 61′7¾″, standard displacement 10,000; geared turbine engines; express type boilers; keel laid December 9, 1936; launched August 27, 1938; **estimated delivery November** 2, 1939.

BB 55, North Carolina, battleship; L.B.P. 714′ 0″, beam to outside armor 108′ 0″, std. displ. 35,000 tons: geared turbine engines: express type boilers. Keel laid October 27, 1937; estimated launching date March 1, 1940: contract delivery September 1, 1941; estimated delivery date October 15, 1941.

Battleship No. 61, order placed June 2, 1939; to be built under authority of Naval Appropriation Act for year 1940. Estimated delivery date August 1, 1943.

IRA S. BUSHEY & SONS, INC.
Foot of Court Street
Brooklyn, N. Y.

NEW CONSTRUCTION: **D. T. Sheridan, all-welded ocean-going tug** for Sheridan Towing Co., of Philadelphia, Pa. 116′ x 26′ x 13′; powered by 1000 H. P. Fairbanks-Morse diesel. Launched July 5, 1939; **delivery date, October 8, 1939.**

CHARLESTON, S. C., NAVY YARD
Charleston, S. C.

NEW CONSTRUCTION:

One harbor tug, Heekon (YT141); LOA 100′, beam 25′; authorized July 7, 1938.

One harbor tug, Nokomis (YT142); LOA 100′, beam 25′; authorized July 7, 1938.

Six destroyers.

Two destroyers, DD443, Swanson; and DD444, Ingraham; authorized March 27, 1934.

One harbor tug, YT143, Small.

DEFOE BOAT & MOTOR WORKS
Bay City, Mich.

NEW CONSTRUCTION:

Hull No. 166, sub-chaser PC-451, for U. S. Navy. Diesel driven; 170′ x 21′ 6″. General Motors engines; steel construction. Delivery date June, 1940.

THE DRAVO CORPORATION
Engineering Works Division
Pittsburgh, Pa., and Wilmington, Del.

NEW CONSTRUCTION:

Hull No. 1567, one welded flush deck cargo box barge 100′ x 26′ x 6′ 6″ for stock; 165 gross tons.

Hulls Nos. 1569-1572, four welded flush deck cargo box barges 130′ x 30′ x 7′ 6″ for stock; 1000 gross tons.

Hulls Nos. 1576-1577, two welded steel oil barges 195′ x 35′ x 10′ for stock; 1222 gross tons.

Hull No. 1594, one welded steel wharfboat hull 296′ 2″ x 57′ x 6′; 4840 gross tons.

Hulls Nos. 1595-1604, ten welded steel coal barges 175′ x 26′ x 11′ overall for stock; 4720 gross tons.

Hulls Nos. 1605-1608, four welded covered cargo barges 175′ x 26′ x 11′; 2120 gross tons.

Hulls Nos. 1609-1622, fourteen welded steel coal barges 175′ x 26′ x 11′ for stock; 4720 gross tons.

Hulls Nos. 1623-1628, six welded steel coal barges 134′ x 34′ x 17′ for stock: 4602 gross tons.

Hull No. 1629, one welded steel oil barge 101′ x 34′ x 13′ for Val Line, Inc., N.Y.C.; 397 gross tons.

Hulls Nos. 1630-1639, ten welded steel coal barges 175′ x 26′ x 11′ for stock; 4720 gross tons.

Hull No. 1650, one welded steel coal barge 170′ x 40′ x 17′ for Oliver Transportation Co., Philadelphia, Pa.; 1100 gross tons.

ELECTRIC BOAT CO.
Groton, Conn.

NEW CONSTRUCTION:

Hull No. 33, Seadragon (SS194); 1450 tons: keel laying date April 18, 1938; launched April 21, 1939: **delivery date, October, 1939.**

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Hull No. 34, Sealion (SS195); 1450 tons; keel laying date June 20, 1938; launched May 25, 1939; delivery date December, 1939.

Hull No. 35, Tambor (SS198); standard displacement 1475 tons; keel laying date January 16, 1939; delivery date August, 1940.

Hull No. 36, Tautog (SS199); standard displacement 1475 tons; keel laying date March 2, 1939; delivery date October, 1940.

Hull No. 37, Thresher (SS200); standard displacement 1475 tons; keel laying date May 15, 1939; delivery date December, 1940.

Hull No. 39 Gar (SS206); standard displacement 1475 tons.

Hull No. 40 Grampus (SS207); standard displacement 1475 tons.

Hull No. 41 Grayback (SS208); standard displacement 1475 tons.

Hull No. 42, Mackerel (SS204); standard displacement 800 tons.

THE FEDERAL SHIPBUILDING AND DRY DOCK COMPANY
Kearny, N. J.

NEW CONSTRUCTION:

Hull No. 153, tanker for Standard Oil Co. of N. J.; keel laid March 13, 1939; **estimated launching date November 4, 1939.**

Hulls Nos. 157, Flying Cloud; 158 and 159; three C-2 cargo vessels for U. S. Maritime Commission. Keels laid March 16 and May 26, 1939. No. 157 launched September 30, 1939.

Hulls Nos. 160 and 161, two torpedo boat destroyers for the United States Navy. Keels laid March 1, 1939.

Hulls Nos. 162-167, six C-3 cargo vessels for U. S. Maritime Commission. Keel laid, No. 162, May 8, 1939.

Hulls Nos. 168-169, two 6000 ton cruisers for U. S. Navy.

Hulls Nos. 170-171, two torpedo boat destroyers for the United States Navy.

Hulls Nos. 172-176, five C-1 cargo vessels for U. S. Maritime Commission.

Hulls Nos. 177 and 178, two tankers for the Standard Oil Co. of N. J.

LEVINGSTON SHIPBUILDING CO.
Orange, Texas

NEW CONSTRUCTION:

One all welded towboat; LOA 80', beam OA 22' 7", depth 9' 6". Powered by 550 H.P. diesel. For W. G. Coyle & Co., New Orleans, La. Delivery date January, 1940.

One all welded diesel electric automobile and passenger ferry 185' 2½" LOA x 55' beam over guards x 15' 6" deep, for The Electric Ferries, Inc., NYC. Powered with 950 H.P. General Motors diesel with one 750 H.P. propelling motor. Delivery date, January 1, 1940.

One all-welded twin screw automobile and passenger ferry; 132' LOA, 43' 8½" beam and 10' deep; for Venezuela interests. Powered with two 200 H.P. Atlas diesel engines.

THE NEW YORK SHIPBUILDING CORPORATION
Camden, N. J.

NEW CONSTRUCTION:

One destroyer tender for U. S. Navy; order placed December 27, 1937. Launched May, 1939.

One seaplane tender for U. S. Navy; order placed December 27, 1937.

One destroyer tender for U. S. Navy; order placed October 14, 1938.

One seaplane tender for U. S. Navy; order placed October 14, 1938.

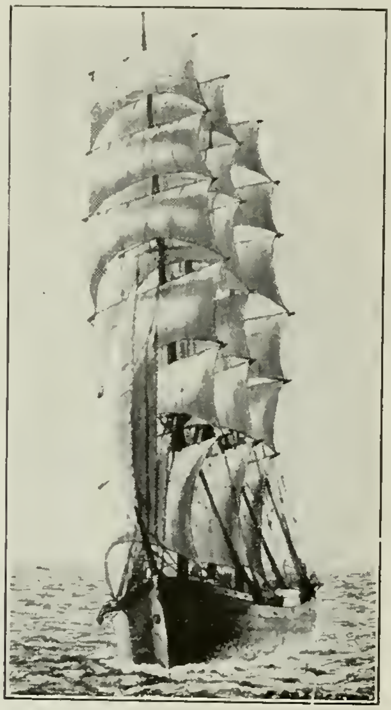
One battleship for U. S. Navy; order placed December 1, 1938. Keel laid July, 1939.

One repair ship for U. S. Navy; order placed July 20, 1939.

NEWPORT NEWS SHIPBUILDING & DRYDOCK CO.
90 Broad Street, New York

NEW CONSTRUCTION:

Hulls Nos. 363-364, two destroyers, Nos. 413, Mustin, and 414, Russell; keels laid December, 1937; launched December 8, 1938. **No. 363 delivered September 15, 1939.**



Hull No. 369, twin screw mail, passenger and cargo liner for United States Lines Co.; length 723', beam 92', depth 45'. Keel laid August 22, 1938; launching date, August 31, 1939.

Hulls Nos. 370, 371 and 372, three oil tankers for Standard Oil Company of New Jersey; gross tonnage about 11,500 tons; L.B.P. 525', breadth molded 75', depth molded 39'. Keels laid, No. 370, January 16, 1939; No. 371, May 8, 1939. No. 370 launched September 29, 1939.

Hulls Nos. 373, 374, 375 and 376, four single screw cargo vessels for United States Maritime Commission; turbine propulsion; gross tonnage, Nos. 373 and 374, about 7300 tons; Nos. 375 and 376, about 8000 tons; length 435', breadth 63', depth 40' 6". Keels laid, No. 373, November 14, 1938; No. 374, November 28, 1938; No. 375, March 6, 1939; No. 376, May 1, 1939. Launching dates, No. 373, April 28, 1939; No. 374; June 21, 1939.

Hull No. 378, battleship, 58, Indiana, for U. S. Navy.

Hulls Nos. 379, 380, 381, 382, 383 and 384, six single screw combination passenger and cargo vessels for U. S. Maritime Commission; length 465', breadth 69' 6", depth 42' 6", gross tonnage about 9100 tons. Keel laid, No. 379, October 2, 1939.

Hull No. 385, aircraft carrier No. 8, Hornet, for U. S. Navy.

PORTSMOUTH, N. H., NAVY YARD
Portsmouth, N. H.

NEW CONSTRUCTION:

Seven submarines, Searaven, Seawolf, Triton, Trout, Marlin, Grayling and Grenadier.

THE PUSEY & JONES CORP.
Wilmington, Del.

NEW CONSTRUCTION:

Two streamlined diesel tugs for Curtis Bay Towing Company; powered by 320 H.P. Enterprise engines; cost $200,000. **Launching date, October 1939; delivery date, November, 1939.**

SUN SHIPBUILDING AND DRY DOCK COMPANY
Chester, Pa.

NEW CONSTRUCTION:

Hulls Nos. 179-180, two single screw diesel cargo vessels, C-2 design, for U. S. Maritime Commission; equipped with Sun-Doxford engines. **Delivery dates, No. 179, October 13, 1939; No. 180, October 27, 1939.**

Hulls Nos. 182, 183, 184 and 185, four single screw diesel cargo vessels for U. S. Maritime Commission, C-3 design. Equipped with Busch Sulzer engines. **Delivery dates, November 15, 1939;** December 20, 1939; January 20, 1940, and February 20, 1940.

Hulls Nos. 186-189, four C-3 single screw combination passenger and cargo vessels; diesel propelled; equipped with Sun-Doxford engines. Delivery dates October 6, 1940; December 5, 1940; February 3, 1941, and April 4, 1941.

Hull No. 190, one 16-knot tanker for Texas Co.; single screw steam turbine; 13,285 tons dwt. Delivery date, June, 1940.

Hulls Nos. 191-192, two single screw steam turbine railroad car carriers for Seatrain Lines, Inc. Keels laid July 28 and August 17, 1939; delivery dates April 15, 1940, and June 1, 1940.

TAMPA SHIPBUILDING & ENGINEERING CO.
P. O. Box 1838
Tampa, Fla.

NEW CONSTRUCTION:

Hulls Nos. 33-36, four C-2 type cargo vessels for U. S. Maritime Commission; 459' x 63' x 31' 6"; 9291 dwt. tons; diesel powered. **Launching date, October 31, 1939.**

Hulls Nos. 37-40, four C-2 type cargo vessels for U. S. Maritime Commission; 459' x 63' x 31' 6"; 9291 dwt. tons.

DRYDOCK AND ROUTINE REPAIRS:

Cuba.

ACIFIC ARINE EVIEW

December
1939

The ROPE made for the We

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PACIFIC MARINE REVIEW

Contents - December, 1939

Editorial Comment:

Opportunities for American Ship Operators 17
Some Reasons for High Cost of American Ships 18
By H. Gerrish Smith.
Diesels for Seattle-Tacoma C-1 Ships to be Built by Hooven-Owens-Rentschler 20
With the Naval Architects and Marine Engineers 22
From Ship Rats to Superliners.
Modern Tanker Design 25
By N. J. Pluymert.
Steamship Lines and Importers 28
By J. F. McArt.
Pacific Northwest Marine Review 31
By Chas. F. A. Mann.
Beachcomber's Loot 33
Cargo Liner Features Rapid Cargo Handling 34
By A. O. Loomis.
Most Powerful Electro-Hydraulic Dredge 36
Your Problems Answered 38
By "The Chief."
Steady As You Go! 41
On the Ways 44
Latest News from American Shipyards.
Maritime Commission to Train Apprentice Seamen 47
Building in American Yards 62
Miscellaneous: Portable Dynamic Balancing Equipment, 37; Engineers' Licenses, 40; Change of Masters, 41; Deck Officers' Licenses, 42; Melville Medal Awarded for Marine Paper, 43; Organization Activities, 48.

PUBLISHED AT 500 SANSOME STREET. . . . . SAN FRANCISCO

Entered as second class matter June 20, 1913, at the post office. San Francisco, under the Act of March 3, 1879. Published on the 1st of each month. Advertising and editorial forms close on the 15th. Subscription price, one year: Domestic, $1.50. foreign, $2.50. two years. Domestic, $2.50; foreign, $4.00; three years: Domestic, $3.00: foreign, $5.50: single copies, 25c. Chas. F. A. Mann, Northwest Representative, 1110 Puget Sound Bank Bldg., Tacoma, Washington. New York Office, Suite 404-405-406, Two Hundred Broadway, Telephone COrdlandt 7-3579.

In New York City copies of Pacific Marine Review can be purchased at the news stands of I. Goldberg, 42 Broadway. Harry Nash, 17 Battery Place: Philip Mandara, Greenwich Street and Battery Place. In Washington, D. C., at the news stand of the Carlton Hotel, 16th and K Streets.

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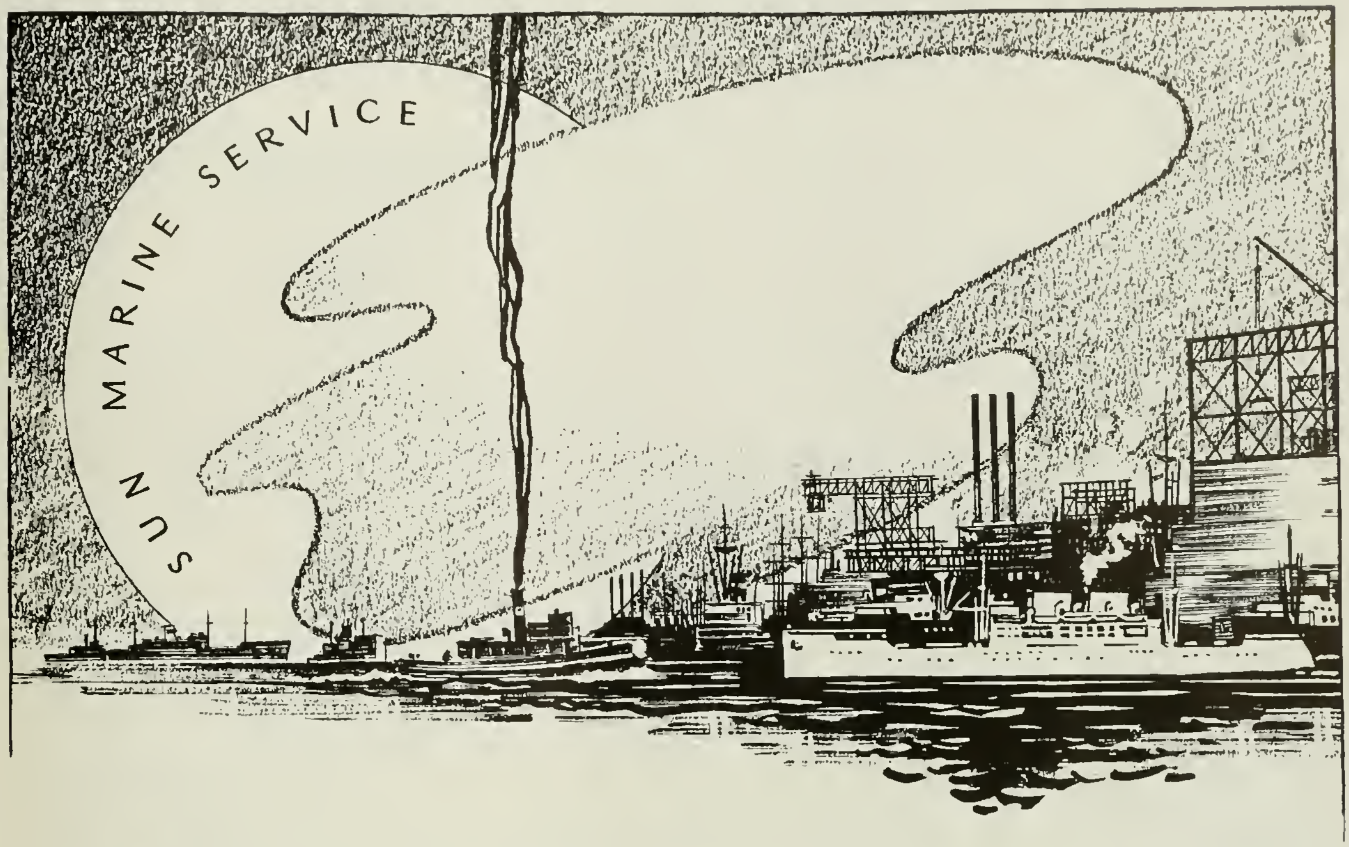

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WRITE-OFF	*Correctly engineered machine tools* which pay for themselv quickly by their saving to you.
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ave You the Most?

EPENDABILITY AND DURABILITY	*Correctly engineered machine tools* permit high output with freedom from nuisance interruptions and "down-time".
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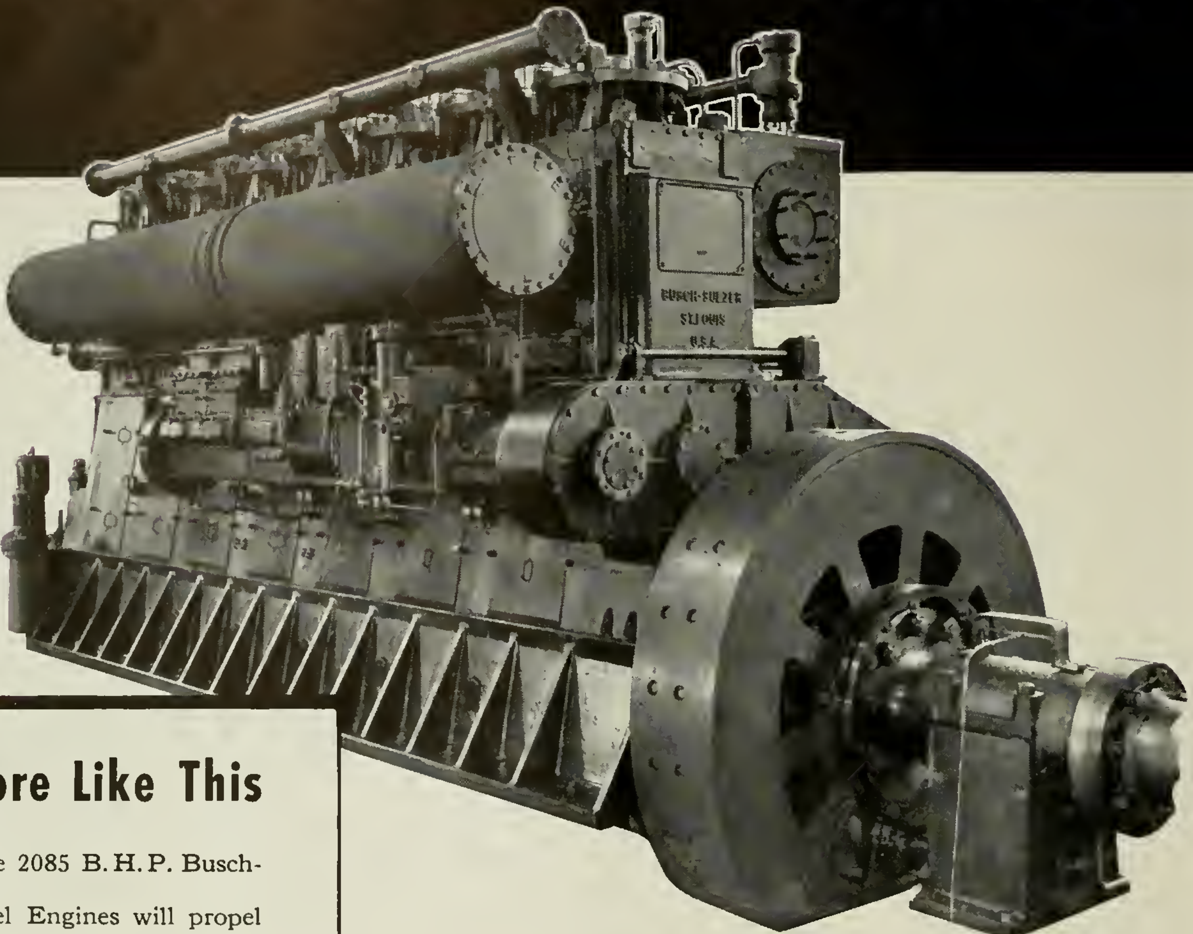

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Ten of these 2085 B. H. P. Busch-Sulzer Diesel Engines will propel the five C-I ships now building at the shipyard of the Western Pipe & Steel Company of San Francisco.

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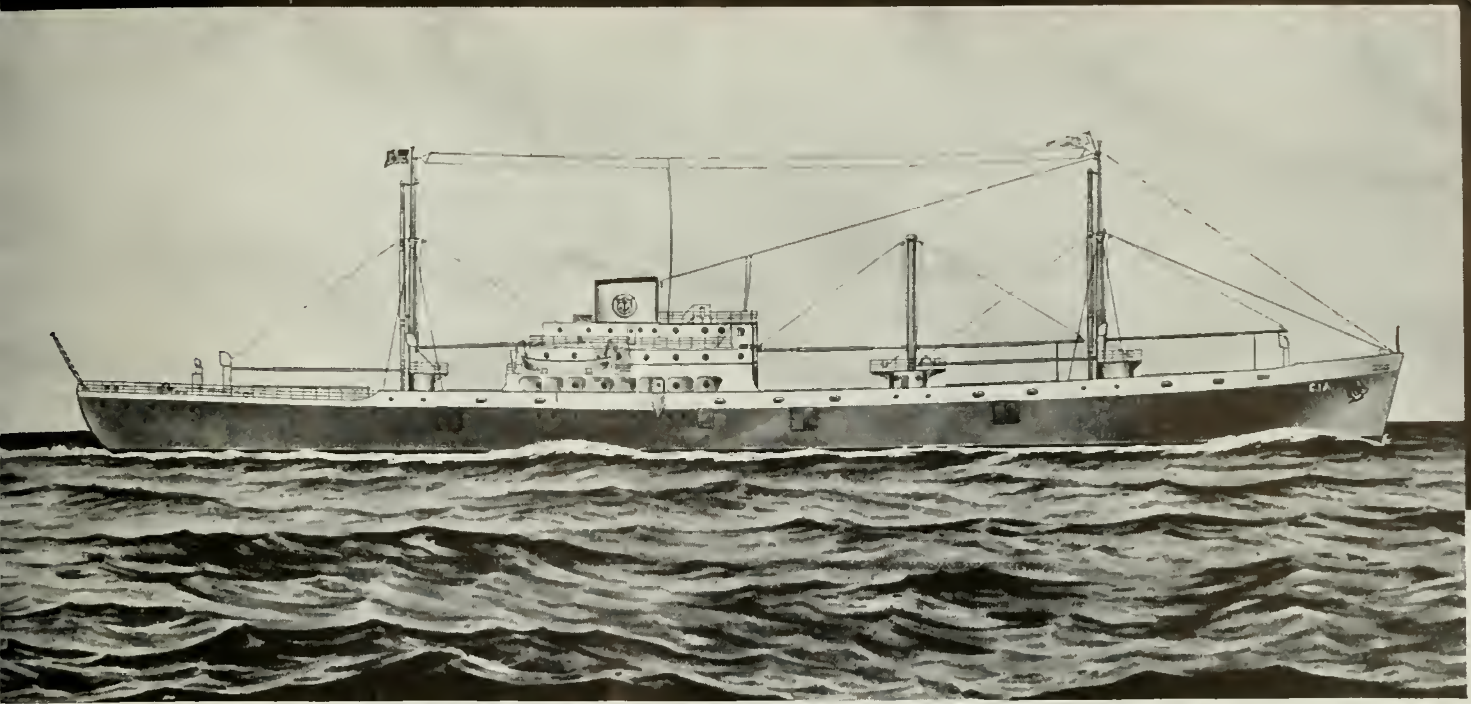

Artist's conception of the new C-I Diesel-propelled cargo ships

FIVE C-I MOTORSHIPS... TEN BUSCH-SULZER DIESELS

Each of the five C-I motorships awarded by the U.S. Maritime Commission to Western Pipe & Steel Company is to be powered by two 2085 B.H.P. Busch-Sulzer Diesels...driving a single screw shaft through single reduction gears and electric couplings.

With the ten engines for five C-I motorships and sixteen engines for four C-3 motorships, a total of 26 Busch-Sulzer Diesels will be in operation propelling vessels of the U.S. Maritime Commission. What could be better proof of Busch-Sulzer's reputation for dependability...and low cost through the years?

Count on Busch-Sulzer to give you the right engine with the right performance. Busch-Sulzer engines *pay* as they go—and they go *farther*. For example, the motor ferries "Chippewa" and "Kalakala," both powered with Busch-Sulzer Diesels, have given consistent and economical service without a single day's delay from engine failure for seven and four years, respectively.

t less Cost!

BUSCH-SULZER BROS.
DIESEL ENGINE CO.
America's Oldest Builder of DIESEL ENGINES

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BUSCH-SULZER
ST. LOUIS

B. B. Howard, General Manager, Marine Department, Standard Oil Company of N. J.

At a meeting of the Board of Directors of the Standard Oil Company of New Jersey on October 6, B. B. Howard was elected a vice-president and was appointed general manager of the Marine Department, to succeed Robert F. Hand, who retired from active duty on October 1. Mr. Howard had been elected a director of the company at the annual meeting of stockholders on October 3. C. E. Klitgaard continues as assistant general manager of the Marine Department.

A native of Annapolis and a graduate of the United States Naval Academy, Mr. Howard saw active service in the Navy in both deck and engine departments, and when he resigned in 1919 held the rank of Lt. Commander. He joined the Standard Oil Company of New Jersey's Marine Department in 1920 as a general assistant in the Operating Division, in 1922 became foreign representative for the company in Paris, and in 1929 became London representative of the Standard Shipping Company. Returning to New York in 1934 as assistant to the late R. L. Hague, in 1938 he assumed the duties of assistant general manager of the Marine Department.

PACIFIC MARINE REVIEW

VOLUME 36
No. 12

DECEMBER
1939

Opportunities for American Ship Operators

The recently-enacted neutrality legislation debars American-flag tonnage from the belligerent ports of Europe, and thus forces some 51 American-flag ships to give up their orthodox trade routes and tie up in Atlantic Coast ports, or invade other routes that are still open. This fleet of 51 vessels aggregates some 345,000 gross tons.

It is not surprising that the owners of some of these vessels should immediately seek permission to change registry on some of their vessels to the flag of some foreign nation under which they would still be free to operate in their accustomed trades.

It seems to this writer somewhat peculiar that these requests should all specify the flag of Panama. The Pan-American Congress, at the suggestion of the United States, recently presented to the world a united front in advanced neutrality when it unanimously adopted the Panama Declaration. It would be but a logical step farther along the line of united action if all the nations subscribing to the Panama Declaration passed neutrality enactments based on the law just added to the statute books at Washington.

It seems to us that the American merchant marine is now, or very soon will be, facing two great opportunities. As we see it, these are:

First, the opportunity to sell our old tonnage.

Second, the opportunity to develop new foreign trade with our better and newer ships.

If we knew positively that the wars now occupying the direct attention of seventy per cent of the world's population would be over in a few months, and the world return to normal, then we need waste no time on studying these special opportunities.

However, history and experience seem to indicate that these wars will last for years, and will cause tremendous dislocation in the normal operations of international trade and shipping.

It is more than probable that the Allies may at any time have drastic sudden demands for large quantities of ocean tonnage. Why not sell them our old tonnage "cash and carry," like any other contraband? In this connection we note American-flag steam trawlers asking the Maritime Commission for permission to sell to the French Government.

A recent release from the U. S. Maritime Commission indicates that several American shipowners have already taken advantage of foreign selling possibilities. During the eleven months ending November 15, 1939, the Commission approved sales to foreign registry of 106 vessels, aggregating 313,346 gross tons. Fifty-five of these ships were over 2,000 gross tons each. Only 22 of the total went to Panama; Brazil got 16, the British Empire got 36, and the balance were divided between eleven nations.

On the opportunity to develop new trade routes, we note that over ninety per cent of the ocean surface of the globe is still unrestricted area for American-flag shipping. It is almost inevitable that much of the Allied shipping now serving international trade will be diverted to the transportation of munitions and troops.

This should furnish profitable opportunity for trade development to American exporters and importers, and profitable cargoes to American ships. Much of the former trade of all belligerents will be open to intelligent development by neutrals. We certainly should buy up a large share in these opportunities.

To All Readers and Friends, Pacific Marine Review Extends Best Wishes for a Merry Christmas and a Happy New Year

Some Reasons for High Cost of American Ships

By H. GERRISH SMITH

President, National Council of American Shipbuilders

Since the World War, the speed of cargo vessels has been increased on the average from 11 knots to 15½ knots.

On the basis of earlier designs, such an increase in speed would require more than double the power, and therefore double the fuel consumption, but improvements in lines, propulsion and specific fuel consumption have kept the fuel cost of power per knot to practically the same for the 15½-knot ship as for the earlier 11-knot ship.

Reduction in the weight of the ship by the use of welding and the use of more efficient machinery have made possible a greater deadweight capacity within the same overall dimensions.

These improvements have made it possible for three ships of today's design to do the work of four ships of the older design.

Other features of the design to meet owner and Government requirements or to comply with new Acts of Congress to make a more workable and a safer ship are as follows:

Improved accommodations for all members of the crew, including locker rooms, washrooms and recreation spaces.

Extension of electricity to the point where virtually everything but the main engines are operated electrically. Expensive but efficient electrical equipment has replaced less expensive and less efficient steam-driven cargo winches, steering gear, anchor gear, capstans and engine room auxiliaries. Its use has made possible the development of desirable equipment unknown in the older ships, such as automatic alarm systems, remote controls, fans and mechanical galley equipment.

The simple cowl ventilators for natural ventilation have virtually disappeared from the latest ships, and in their place are complex mechanical ventilating systems. Cargo holds, once without ventilation, are now well aired by special air conditioning equipment to minimize spoilage of perishable cargoes.

Rat-proofing for the preservation of health of passengers and crew and the protection of cargo.

Greatly extended use of fire-resisting materials — passenger ships are divided into zones to localize fire should it break out, requiring the insulation of many bulkheads and decks within these spaces which would not otherwise be needed; non-combustible material instead of wood in stateroom construction.

Greater subdivision of ships for safety.

Higher standards for life-saving equipment; automatic watertight doors; greatly increased fresh water evaporating capacity.

Radio direction finders; electrical sounding devices; gyro compasses and mechanical steering apparatus to take the place of the compass and the lead.

More outside rooms for passengers on passenger vessels.

The additional requirements must be warranted by a resultant increased efficiency and safety or a reduced operating cost, but certainly the increased cost due to their addition cannot be laid at the shipbuilder's door.

The cost of ships, however, does not stop with these added owner and Government requirements, for the following reasons:

In the good old days of wooden hulls, iron men and cotton duck power generators, American shipbuilders were able to turn out the world's finest ships at prices that were attractive not only to Americans but to many foreign buyers. Then abundant and cheap shipbuilding lumber and low-cost skilled labor were both on the American side. Now the reverse conditions prevail, and America enjoys the highest shipbuilding costs.

Wages today are higher than at any time in the past, including the war period and 1929. Shorter working hours required by law have increased the time to construct a vessel, because many highly skilled operations cannot be carried on by second and third shifts. A longer time of construction increases the overhead expense. Overtime allowances have been increased. Vacation with pay is now quite general. Increased taxes, both local and Federal, and social security taxes where none existed a few years ago, have added to cost. Increased labor questions following passage of the Wagner Act, the Walsh-Healey Act and the Wage-Hour Act, and the increased cost of workmen's compensation by broadening the scope of State laws have added to cost.

National defense features in some cases require more power and speed than necessary for peacetime operation, thereby adding to cost; some defense features are an integral part of the ship's structure and add to cost.

These various elements of increased labor cost are not peculiar to shipbuilding alone, but are experienced likewise by the suppliers of material from whom the shipyard must purchase such items as steel, boilers, turbines, navigating equipment. Practically all classes of material cost more now than in the past. There has also been an increased demand for special and higher grade materials.

Delays occasioned by Government inspection and approvals are vastly greater now than a few years ago. At the present time, plans of an ordinary cargo ship are subject to approval by the Maritime Commission, Navy Department, Public Health Service, and the Bureau of Marine Inspection and Navigation under the Department of Commerce. Plans are also subject to approval by a Classification Society, such as the American Bureau of Shipping, Lloyd's or both.

The increase in shipbuilding costs is not limited to the United States. They have gone up abroad as well as here, but, as stated, the requirements and specifications for American vessels are much more exacting than for foreign vessels in a similar service.

Effect of Standardization

A little study of the problems involved in the construction of a made-to-order article like a ship, as compared with a mass-production article like an automobile, will show clearly to anyone who cares to investigate the subject the necessary difference in the methods of production employed for each and the effect of mass production on reduction of cost. A specially-designed automobile, not standard, would cost many times as much as a standard automobile produced in quantities.

Actual quotations within the past two years for ships for the Maritime Commission and private operators show that in every case where bids are called for two, three, four, five, six or eight ships, the bid per ship for more than one has been less than for one ship of a design, the average reduction in bids for four ships of the C-2 type being about 13 per cent each less than the cost of one ship; the average reduction for four ships of the C-3 cargo type about 10 per cent less; the C-3 passenger and cargo type, about 11 per cent less; and the C-1 cargo type, about 16 per cent less.

An analysis of the bids on the C-1, C-2 and C-3 cargo ships, the C-3 passenger-cargo ships, ships for the Seas Shipping Company, for the Export Line and for the Mississippi Shipping Company show that for 60 of these ships, where bids were submitted for group construction as well as for a single ship, that the actual saving on group construction bids would be in excess of $18,000,000; in other words, a sum sufficient to build 9 additional C-1 ships.

The Maritime Commission has performed a commendable job through a substantial degree of standardization of ship forms and characteristics, which has made possible the ordering of groups of ships of the same design, and has thereby effected considerable savings, as indicated above, for each ship of a group under the cost of a single ship of a given design, and by limiting the number of designs, it is permitting the program to be carried out with a much smaller technical staff of shipyard employees than would otherwise be the case.

Competition Keen

The shipbuilder offers no apologies on the subject of efficiency. There are numerous shipyards in the United States, in different geographical locations, owned by different interests, run by different managements, and each doing its best to devise ways and means of building ships at less than the cost to the other fellow. Competition alone is a sufficient incentive to each shipyard to do its best to produce at a minimum of cost.

Every conceivable method to increase shipyard efficiency has been studied, and those judged to be sound have been adopted. Some yards have built up extensive organizations for producing plans covering every detail of construction, for arranging schedules for the orderly progress of each part of the work and with ample supervision to see that each workman knows exactly what he has to do and that he does it at the proper time to dovetail into other work under way. Other yards have tried and are trying the plan of keeping down organizations, issuing only the least possible instructions, and leaving it as much as possible to foremen and workmen to build the ships. Some yards have production departments of considerable extent, and a production manager whose sole duty it is to provide for the most efficient possible production.

The shipyard practices of the different shipyards are well known each to the other, and there is a pretty good knowledge in American yards of the practices in foreign shipyards, and it is incredible that those same shipyard managements that have produced efficient designs and "good ships" have not devoted equal energy to the development of efficient methods of production.

Equipment Up To Date

As a matter of fact, the going shipyards of the United States have kept their equipment up to date since the World War, many times when there has been promise of but little work ahead for them, and they have given close attention to the development of efficient methods of shipyard operation.

The shipbuilding industry is appreciative of the problems confronting the ship operator, and has every reason to be sympathetic toward their solution. No shipbuilder profits in the long run by a curtailment of the volume of his business. Every shipbuilder, therefore, has every reason for reducing the costs of shipbuilding in order that his yard may remain active. But the shipbuilder has to provide what is ordered, not what is least expensive. His bid is controlled by the specifications. He is confronted in his operations by many matters largely beyond his influence. His own best interests are served by a policy of fairness to all elements concerned in the problem of upbuilding the American merchant marine. If there were anything inherently unsound in his methods, he would be the first to desire to correct it.

The shipbuilding industry is proud of its achievements in the design and construction of vessels and in shipyard operation, and believes it has been well at the forefront in the advancements that have been made by industry in the twenty-year period since the World War.

Diesels for
SEATTLE-TACOMA
C-1 Ships to be Built by

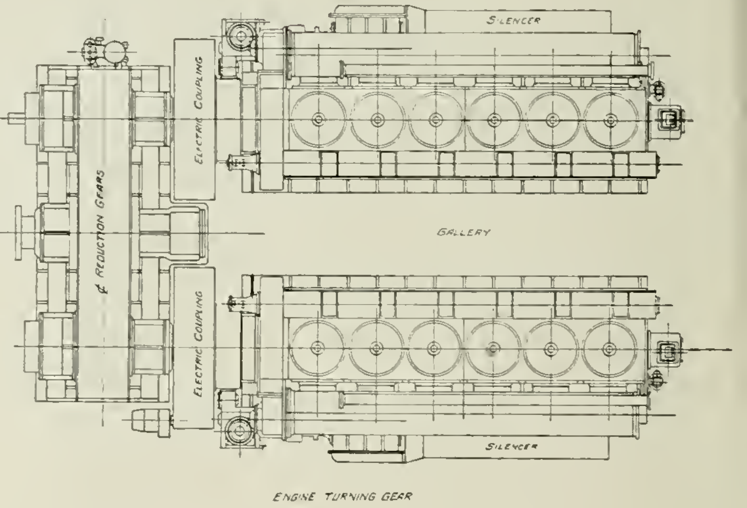
Engines for the five full scantling C-1 motorships to be fabricated and erected at the Tacoma yard of the Seattle-Tacoma Shipbuilding Company will be built by the General Machinery Corporation, Hooven-Owens-Rentschler plant, at Hamilton, Ohio. There will be ten of these engines, two being required for each ship.

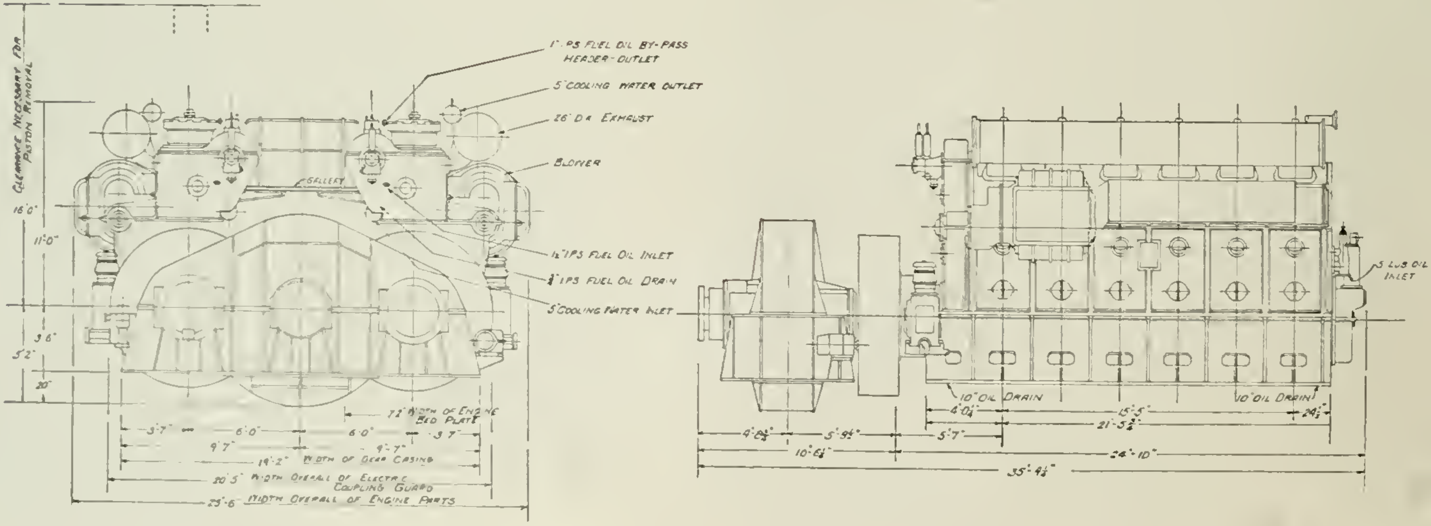
The engine to be used is a 2-cycle, single-acting, solid-injection diesel of six cylinders. Each cylinder will be of 21.5 inches bore and 27.5 inches stroke. At 233 r.p.m. this unit will develop 2,100 shaft horsepower.

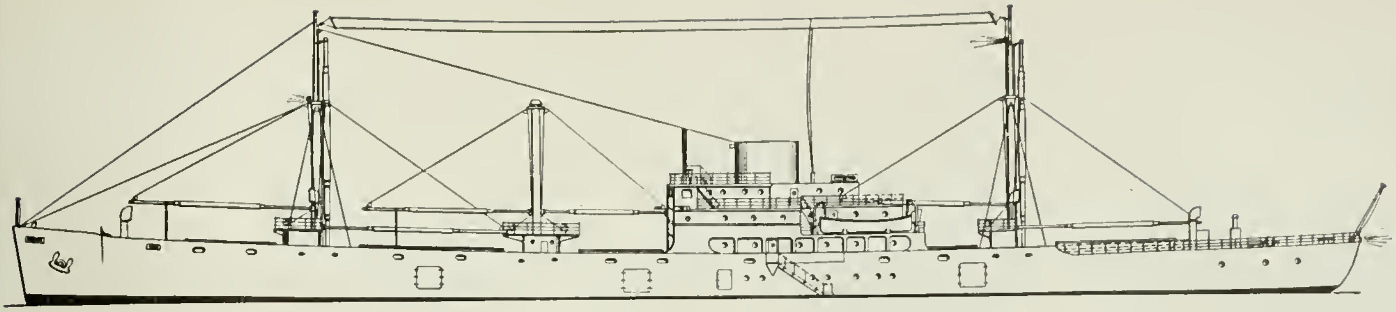
In each ship the power plant will comprise two of these units installed alongside of each other with center lines parallel. Each of the two engines will be connected through a Westinghouse electro-dynamic coupling to one of the pinion shafts of a single-reduction Westinghouse gear. The low-speed gear shaft carries a Kingsbury thrust bearing mounted in the gear case, and is directly connected to the propeller shaft. Specifications call for 4,000 shaft horsepower delivered to the propeller shaft at 90 r.p.m. of the propeller, and the naval architects and propeller designers figure that these revolutions and this power will give the vessel a sea speed of 14 knots under average conditions.

Specifications also call for engines that will operate for two hours at 125 per cent normal full load and

End elevation, side elevation and arrangement plan of installation of two diesel engines connected by electric coupling and reducing gear to single-screw shaft on board C-1 type cargo vessels.







Hooven - Owens - Rentschler

Ten 2-Cycle, Single-acting, Solid-injection, Six-cylinder Diesels for Five Motorships

that will operate continuously at 110 per cent normal full load. In other words, these two engines must be capable of delivering 4,400 shaft horsepower continuously and 5,000 shaft horsepower for two hours. It is estimated by the commission designers that this overload ability will enable the power plant to maintain 14 knots schedule under any conditions likely to be met at sea.

The engines are of the well-known Hamilton type, with M. A. N. scavenging system. Scavenge air is furnished an attached blower driven by the crank shaft through suitable gearing.

Cooling medium for cylinder walls and cylinder heads will be fresh water recirculated through heat exchangers cooled by sea water. Pistons will be cooled with lubricating oil circulated and cooled in the same manner as the fresh water coolant. Circulation of both coolants is effected by independent electric motor-drive pumps.

Both engines will be operated from a central control stand, with interlocking devices on the controls so as to make them as nearly as possible "foolproof." In maneuvering at slow speeds, one engine may be in ahead operation, the other in reverse, and control of propeller rotation may be made by the electro-dynamic clutches. Using this method, 50 per cent backing or ahead power is instantly available without the interval of time necessary to reverse the engines.

The intake for scavenging and combustion air is directly from the engine room through an especially-designed intake silencer attached to the engine casing and connecting directly to the blower suction. The exhaust from the engine cylinders will pass through a Foster Wheeler waste heat boiler, which acts as an exhaust silencer and at the same time recovers the exhaust heat in the form of low-pressure steam for cooking and heating purposes.

This engine is of a well-proved design, many examples of which have been in economical and efficient operation ashore and afloat for years.

In its design, full consideration was given to the reliability and dependability so necessary in marine service. The crank shaft and other important parts are arranged for maximum accessibility. For an engine of its normal rating, the crank shaft is exceptionally large, giving more than adequate bearing surfaces and very low specific bearing pressures.

The fuel injection system employs an independent fuel pump for each cylinder, located close to the cylinder and arranged in a symmetrical manner, so that each fuel pipe is of the same length and of the shortest practicable length. This arrangement makes it easy to equalize the loads on the cylinders. Fuel nozzles are of the Bosch standard type. The fuel valve cam shaft is located at the top of the cylinders and is driven from the crank shaft through vertical shaft and gearing.

The Hooven - Owens - Rentschler plant at Hamilton was very well and favorably known to the marine industry during the great Shipping Board war-time ship building program. During that time this firm built more reciprocating marine steam engines than any other in this country. They began building marine diesel engines during that period, and have produced the diesel power plants of many fine motorships, including:

M. S. Seminole
M.S. Wichita
M. S. New Orleans
M. S. John D. Rockefeller, Jr.

The General Machinery Corporation is an important factor in upbuilding the American Merchant Marine. This firm has the shop facilities, the technical experience and the engineering background necessary for manufacturing diesel propulsion plants of the most modern design—plants suitable to drive the vessels required for an up-to-date economical merchant fleet.

With the Naval Architects and Marine Engineers

From Ship Rats to Superliners

The annual meeting of the Society of Naval Architects and Marine Engineers at New York, November 16 and 17, 1939, gave consideration to nine technical papers covering a wide range of topics from "Behavior of Ship Plating under Compression and Hydrostatic Pressure" through "Rat Proofing" to "Will American Superliners Pay?"

The program was a little unbalanced in its coverage of the principal aspects of the work of marine enineers and naval architects. Five papers dealt with design problems faced by the architects of seagoing structures; two papers covered specialized aspects of design work for marine engineers; and the other two dealt largely with operating problems.

Short abstracts of these papers follow:

Paper I. Ship Plating Under Compression and Hydrostatic Pressure, by Henry W. Bengston, Hull Technical Divisoin, Newport News Shipbuilding & Dry Dock Co.

Mr. Bengston was educated in Sweden and Germany and had considerable ship design and construction experience in both countries before coming to America in 1927. This is a very technical paper full of mathematical equations and citing for explanation a number of German, British and American reference books on analytic mechanics and stress theories.

The author's discussion and conclusions aim at including the "effective width of plating in our stress analysis" for ship hulls both in theory and in experimental tests. His investigations show: that the "effectiveness of the plating is far greater when arranged on longitudinal framing than on transverse"; that the "practice of some classification societies to permit a reduction in plating thickness for longitudinally framed vessels is fully justified"; that the "greatest attention should be paid to deck plating in compression"; and that "it is necessary to ascertain the bending stresses in underwater plating."

Answering his own question, "To what extent can higher yield point material be reduced in thickness without impairing the strength?" he compares ordinary ship steel of 45,000 lbs. per sq. in. yield point with steels of 60,000 and 90,000 lbs. per sq. in. yield point and finds that his own formula would allow respectively 16% and 33% reductions in thickness of plating and that the Karman formula would give 13% and 29% reductions—and expresses the hope "that responsible authorities will not let the column theory of failures in plates stand in the way of a development toward the lighter and more efficient vessels made possible by the use of high strength materials, although obviously other factors than yield point strength must be considered for such materials." Concluding, he wishes to emphasize, "that for further development in shipbuilding active coordinated research is equally important in the field of structures as in propulsion."

Paper II Graphical Analysis of Pipe Stresses, by Oscar J. Baggerud and Karl W. Jernstrom, Engineers, Federal Shipbuilding & D. D. Co.

A description of a graphical method of quick determination of stresses at all points in any form of pipe bend and a number of practice examples applying this method to forms of bend ordinarily found in ship piping layouts.

Authors' conclusion: "Bends in one plane only are treated and no attempt has been made to go into the problem of stress calculation for bends in space. For bends in one plane the procedure is simple with the graphical method shown.

"For bends in more than one plane the exact computation is extremely difficult and lengthy, and for irregular bends entirely impractical. By using the graphical method with certain modifications bends of any shape with fixed ends can be dealt with. The result is always on the safe side."

Paper No. III. Modern Tanker Design, by N. J. Pluymert, Naval Architect, Socony Vacuum Oil Co.

This paper is reproduced in full elsewhere in this issue.

Paper No. IV. Geared Diesel Marine Application, by Lieut. Com. W. D. Leggett, Jr., U.S.N.

A comprehensive sketch of the history of the geared diesel drive. The tables reproduced herewith show the scope of this history.

Author's summary states:

"Gearing of diesel engines offers an immediate saving in weight over other types of diesel drive available. This weight saving is of course interpretable in terms of additional cargo or additional armament. It permits a greater choice of arrangement and an appreciable saving of space over the direct-connected type of engine. It facilitates maintenance by the vessel's own personnel. The use of multiple units makes practical economical operation over a wide speed range.

"The introduction of gearing not only enables the engine designer to build the engine in the manner which he considers most suitable but also enables the ship designer to select an engine of standard type which conforms most effectively to

TABLE 1.—IMPORTANT MILESTONES IN THE HISTORY OF MARINE GEARED DIESEL DRIVES

Name and Date		Tonnage, D.W.C.	Speed, knots	Number of propellers	Number of engines per shaft and engine type	H.P. each shaft	Type of clutch	Engine rpm / Prop. rpm
Ssamoyed (1908)		....	....	Side-wheel	2—Nobel	300	Electro magnetic	270/40
Libby Main (1918)		2250	....	1	2—Dow-Willans	640	Mech. coupling.	250/100
Havelland (1921) *Muensterland* (1921)		10235	12½	2	1—M.A.N.	1700	Mech. coupling	230/85
Falk Generator Drive (1923)		..	....	..	4—Falk	2200	Bibby	200/90
Monte Sarmiento (1925)		8600	14½	2	2—M A.N.	3200	Mech coupling.	215/77
Wulsty Castle (1926)		6300	....	1	2—Beardmore	1600	Vulcan hydraulic	240/90
Milwaukee (1929) *St. Louis* (1929)		10100	16	2	2—M A.N	6000	Mech. coup Hydraulic	220/110
Königsberg (1929) *Karlsruhe* (1929) *Köln* (1929)	German Navy	6000	10	2	1—M.A.N.	900	Hydraulic	900/
Leipzig (1931) *Nürnburg* (1935)	German Navy	6000	18	1	4—M.A.N.	12000	Hydraulic	600/
Bremse (1931)	German Navy	1460	27	2	4—M.A.N.	13000	Hydraulic	600/
Deutschland (1933) *Admiral Scheer* (1934) *Admiral Graf Spee* (1936)	German Navy	10000	26	2	4—M.A.N.	28400	Hydraulic	450/250
Zwarte Zee (1933)		....	17	1	2—Werkspoor	4200	Hydraulic	275/120
Manoeran (1933) *Madoera* (1933) *Mapia* (1934)		14000	15	1	2—Werkspoor-Sulzer	6500	Bibby Bibby Sandner	225/87

his desired ship arrangement. It makes available several equally desirable designs. The trend in engine designs in this country is definitely to speeds too high for direct connection to a propeller.

"The ships which we are designing today will, if their design and construction are sound, be operating some twenty years hence. If the history of shipbuilding in our country does not undergo a marked change, they will constitute not only the nucleus but the bulk of our merchant fleet and naval auxiliaries for that period. With or without subsidy and with the best paid, best fed and best housed crews in the world, they must compete in a world economy.

"There are many indications that the situation in the United States as regards the diesel engine has changed and is changing very rapidly. There are available engines of American manufacture, the reliability and maintenance cost of which is subject to check. Understanding of fundamental problems has progressed to the point where reasonable variations in size or rotative speeds of these units can be undertaken without fear. Experience with gearing and the operation of multiple units both here and abroad has been so universally satisfactory that the selection of a suitable plant for any ship below the luxury liner class should not be hard to evolve. Even limited production with higher revolutions may change the old arguments of weight, space and first cost from objections to advantages.

"Change in marine engineering is necessarily slow but, as elsewhere, inevitable. By its very slowness, the man who makes the right change first is given an appreciable and lasting advantage. So I commend to your study and frequent review the geared marine Diesel with its problems and its promises."

Paper V. Ship Rat Proofing, by P. W. Clark, Senior Naval Architect, U. S. Public Health Service.

A discussion of ship rats, their habits and their cost to ship operators followed by a description of the standards in rat proofing construction which have been developed by the U. S. Public Health Service and other Federal service bureaus. The entire paper can be summed up in one rule given by the author as follows:

"Eliminate all spaces which are not open to visual inspection; entirely surround any mass storage of supplies with a rat proof bulkhead or expanded metal partition; use only rat proof materials and install them in a rat proof manner." The table reproduced herewith shows the gradual elimination of rat infestation at the Port of New York through the introduction of standard rat proof construction.

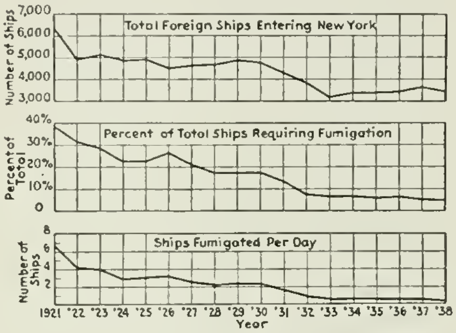


CHART SHOWING DECREASE IN FUMIGATION REQUIRED AS RATPROOF SHIP CONSTRUCTION BECOMES MORE GENERALLY ADOPTED

Paper VI. The Use of High Tensile Steel Rivets in Shipbuilding, by Rear Admiral W. G. Du Bose (C.C.), U.S.N.

This paper describes the failures of high tensile steel rivets in joining galvanized steel members in U.S. Navy destroyers and the extensive experimental investigation into the causes of such failures and into various means of overcoming those causes.

The author concludes that:

"From a consideration of all the results obtained in the present investigation it is apparent that, in order to prevent the cracking of high tensile steel rivets driven into galvanized steel structures, certain relatively simple precautions, hitherto overlooked, must be taken; namely,

"(a) The use of filleted rivets with chamfered rivet holes of corresponding profile.

TABLE 2.—RECENT MARINE GEARED DRIVES OF 1000 HORSEPOWER AND OVER PER SHAFT

Name	Type	Tonnage	Max. speed, knots	Number of Propellers	Number of Engines per shaft and Engine Type	H.P. each shaft	Type of Clutch	Engine rpm. / Prop. rpm. or ratio
Rotterdam Lloyd	Passenger ship	21,000 G	21	2	4-Sulzer	13,500	ASEA electric	......
Robert Ley	Passenger ship	22,000 G	16	..	6-M A N. (total)	12,420 (total)	......	235/117
Oslofjord	Passenger and cargo ship	18,700 G	19	2	2-M A N.	8,800	Hydraulic	212/92
Hamburg Amerika Line	Cargo ship	9,500 C	16½	..	3-M.A.N.	8,000	......	250/125
Netherlands Steamship Company	Cargo ship	11,900 C	16	..	2-M.A.N.	8,000	.. ...	215/84
Goldenfels *Hohenfels* *Neidenfels* *Tannenfels*	Cargo ships	11,600 C	16	1	2-M A.N.	7,600	......	210/86
Leipzig	Cargo ship	5,500 G	..	1	2-M A.N.	6,000	Vulcan hydraulic	.....
U. S Maritime Commission	C-2 cargo ships (4)	9,300	15½	1	2-Nordberg	6,000	American hydraulic	225/92
Wilhelm Gustloff	Passenger ship	25,500 G	16	2	2-M.A.N.	4,800	......	220/125
Anatina *Dagmar Salen* *Morviken*	Cargo ships	9,500 C	14	1	4-Polar	4,400	ASEA electric	300/90
Lech	Cargo ship	3,200 G	..	1	2-Weser-M A N.	3,500	......	230, 90
Formosa	Cargo ship	13,800	14½	2	2-Polar	2,560	ASEA electric	300/130
Astrid Thorden	Cargo ship	3,000 C	14	1	2-Polar	2,040	"	300/130
Fidra *Freja*	Cargo ships	2,500 C	12	1	2-Polar	1,820	"	300/130
Roode Zee	Tug	......	13½	1	2-Smit-M.A.N.	1,800	Vulcan hydraulic	300/115
Anita *Astri*	Cargo ships	3,600 C	12	1	2-Polar	1,740	ASEA electric	298/130
Sisu	Ice-breaker	1,600 G	..	..	1-Polar	1,600	......	320/160
MMS1	H M. Minesweeper	......	..	..	Thornycroft	1,500	......	....
Imperial *Petrolite*	Tankers	3,140	11	1	2-Fairbanks-Morse	1,400	Electric	400/125
Warna *Wernia-Wirds* *Wiril*	Cargo ships	1,300 C	13	1	2-Polar	1,400	ASEA electric	300/130
Blankenberg	Tug	......	..	1	2-Bolnes	1,200	......	....
Torret	Experimental	......	30	2	1-Paxman V-type	1,000	.....	1.696/1 1.162/1 ahead 2.38/1 astern

"(b) The removal of the zinc coating on galvanized steel members at the faying surfaces of all butt joints and at the faying surfaces of seam laps only in those areas that are highly stressed.

"(c) The maintenance of rivet driving temperatures below 2200 degrees F.

"(d) The control of the depth of countersinking to a maximum of three-fourths of the thickness of the countersunk member of the joint.

"The results of this investigation have also emphasized the importance of adhering to the accepted rules of good riveting practice, with especial reference to the necessity for tight bolting of structures prior to riveting and the provision of fair rivet holes. These precautions represent the price that must be paid for the advantages accruing from the increased strength of high tensile steel rivets and from the enhanced corrosion resistance of galvanized steel hulls."

Paper No. VII. Further Form Resistance Experiments, by Capt. E. F. Eggert, U.S.N., Retired.

An extension of a former paper by the same author who, before his recent retirement, was officer-in-charge United States Experimental Model Basin, Washington, D. C.

The experiments forming the basis of the two papers were made with towing models having numbers of strategically located small orifices in their outer skin which opened into small copper tubes. By attaching these tubes to a multiple tube manometer, point-pressure readings could be obtained. Many graphs are shown indicating the contours of change of pressure on the forward and after. Author's conclusion is that:

"The results show that form resistances of models may be obtained by the method herein described, but only after laborious and time-killing work. The method is by no means a practical commercial method, but in special cases, if time is no object, it may be useful.

"Frictional resistance of a ship model may differ from that computed by the standard method, on account of some peculiarity of the form of the model, and it may be either less or greater than the amount so computed. There is at present no reliable way of determining what change should be made in the standard method.

"The augmented resistance of a model, when the propellers are driving it, is only in part a pressure phenomenon. The increase of velocity of the water along the stern, caused by the propeller action, must cause some increase of frictional resistance, as well as eddy resistance, especially on the appendages."

Paper VIII. Some Observations on Merchant Marine Personnel, by H. L. Seward, Professor of Mechanical Marine Engineering, Yale University.

A full report on this paper will appear in the January issue of Pacific Marine Review.

Paper IX. American Superliners—Will They Pay? by George C. Gaede.

Mr. Gaede, who has a long experience as a general passenger agent with some of the largest transatlantic liner operators, advocates two American superliners somewhat larger and faster than Cunard's Queen Mary. He proves by an analysis of the operating revenues and expenses of present superliners that such vessels properly designed and operated will pay.

These two liners, says he: "Would secure 500 to 600 million dollars in revenue in 20 years for American ship operators, with 120 million dollars worth of construction in American shipyards and many other industries throughout the country, and with hundreds of millions going to employment of American labor."

A tall ship on her way to the scrap steel pile.

Modern Tanker Design

By N. J. PLUYMERT

Naval Architect, Socony-Vacuum Oil Company

During the past eight or nine years many improvements have been made in the hull and machinery of tankers which have resulted in material benefits to the shipowner. The increased use of welding in hull construction has brought about a considerable reduction in steel weight, with a consequent increase in the vessels' deadweight. The change from low-pressure steam and diesel to high-pressure steam-turbine drive has led to lighter machinery. In conjunction with these changes there has been a trend toward higher speeds and an increase in cargo deadweight.

A review of some designs of tankers built in recent years, all of nearly the same dimensions, shows the improvements accomplished both in construction and operation. About half of these designs are steam and the other half diesel; half were built in this country and half in Europe. Most of these vessels have now been in operation for a sufficient period of time to obtain accurate service data.

A tabulation of the design particulars, weight analysis and trial and service data has been made. A study of these figures shows points which may be of interest.

The hull particulars of five different designs of steam tankers are tabulated, all but one of which were built in this country. The principal dimensions of all these designs differ only slightly. All designs are on the longitudinal system of framing; some bracketed, some bracketless, the last using round bar brackets and fluted bulkheads.

The first two designs were entirely riveted, with the amount of welding increasing on each succeeding design. The last design has reduced the riveting to shell and main deck strake laps only, with the deck longitudinal riveted to avoid overhead welding, and the entire internal structure is welded using fluted bulkhead construction.

N. J. PLUYMERT

Welding was employed on the first design to secure the ends of the longitudinals to the plating and thus prevent rivet leakage from excessive stress at this point. It was also used on later designs to weld the butts of the bottom plating, eliminating the inside butt straps, as this gave better drainage with the consequent reduction in corrosion.

The amount of welding was increased in the fourth design "D" principally in the engine room where the double-bottom structure was of all-welded construction. The turbine and gear foundation were welded integral with the double bottom. This not only gave a saving in hull weight but provided a more rigid foundation for the propelling machinery.

Welding was also used in this design on the bounding bars of the oil-tight bulkheads, eliminating liners and joggling of the bounding bars. The bilge keel was also welded to the shell.

The favorable experience with a conservative amount of welding on these tankers and experience gained on the smaller tankers led to the building of a practically all-welded 500-foot tanker.

A study of corrosion in the various members of the tank structure indicated the advisability of eliminating pockets and horizontal members where corrosion is accelerated by the collection of scale. The Bethlehem-Frear system was developed with the thought in mind of retarding corrosion as well as saving weight by the use of fluted bulkheads.

The latest design "E" with fluted bulkheads and a major use of welding shows a saving of nearly 1000 tons in the light weight of the vessel and its consequent increase in deadweight and earning power with a hull structure less liable to rapid deterioration or corrosion. This saving was made by a reduction of 800 tons or 18 per cent in hull steel and 200 tons in machinery. This saving in hull steel was not accomplished by using the minimum of permissible scantlings. The members at the top of the cargo tanks and the horizontal members carrying the maximum of 8/100 inch over classification scantling and the members in the center of the tank are as much as 4/100

STEAM GROUP

DIMENSIONS

Design	"A"	"B"	"C"	"D"	"E"
Length overall	500′ 1½″	500′ 1½″	500′ 1½″	501′ 7½″	501′ 7½″
Length B.P.	480′ 0″	483′ 11½″	484′ 0″	485′ 6″	487′ 6″
Length, designed L.W.L.	494′ 11″	495′ 0″	495′ 2½″	497′ 6″	497′ 6″
Breadth, molded	65′ 9″	65′ 9″	65′ 9″	68′ 0″	68′ 0″
Depth, molded	37′ 0″	37′ 0″	37′ 0″	37′ 0″	37′ 0″
Draft, summer freeboard	28′ 10¾″	29′ 6¾″	29′10 ⅞″	30′ ⅛″	30′ 3/16″
Block coeff. (on L W.L.)	0.75	0.753	0.748	0.739	0.739
Prism. coeff. (on L.W.L.)	0.768	0.768	0.763	0.754	0.754
Cargo tank volume, cu. ft.	651,230	669,778	711,642	736,636	751,753
Bunker capacity (17-deg. Bé. oil)	1,800	1,825	1,385	1,315	1,765
Gross tons	9,154	9,767	9,512	9,860	10,222
Net tons	5,583	5,860	5,894	6,129	6,181
Where built	U. S.	England	U. S.	U. S.	U. S.
Entered service	1930	1931	1935	1937	1939

HULL PARTICULARS

Design	"A"	"B"	"C"	"D"	"E"
Construction	Longitudinal bracketless	Longitudinal bracketless	Longitudinal bracketless	Longitudinal bracketless	Longitudinal bracketed, Bethlehem-Frear system
Type of hull	C.L. bbd.	C.L. bhd.	C.L. bhd.	Twin bhd.	Twin bhd.
Shell construction	Riveted	Riveted	Riveted	Riveted	Welded, except strake laps
Interior construction	Riveted	Riveted	Riveted	Riveted	Welded
Interior ends, construction	Riveted	Riveted	Riveted	Welded double bottom	Welded
Deck construction	Riveted	Riveted	Riveted	Riveted	Part welded
No. transverse bulkheads	18	17	18	16	15
No. pump rooms	1—midship	2—midship and forward	2—midship and forward	2—midship and forward	1—aft
Total rivets	970,553	976,098	1,058,976	965,727	122,055
Total welding, feet	.....	.....	12,000	14,500	371,168

WEIGHT ANALYSIS

Design	"A"	"B"	"C"	"D"	"E"
Displacement, summer draft, tons	20,316	20,951	20,832	21,450	21,503
Light weight, tons	5,900	5,924	5,952	5,935	4,953
Deadweight, summer draft, tons	14,416	15,027	14,880	15,515	16,550
Ratio, deadweight to displacement	0.709	0.717	0.714	0.723	0.769
Hull steel	4,400	4,442	4,436	4,491	3,650
Wood and outfit	510	415	632	646	633
Cargo pumps and piping	180	285	254	190	80
Propelling machinery	810	782	630	608	690

inch over the minimum required scantling to allow for corrosion loss.

The hull particulars of four different designs of diesel tankers are tabulated; all but one were built in Europe. The principal dimensions of all these designs are practically identical and compare very closely with the steam tankers.

The use of welding on these designs is somewhat less than that on ships built in the United States. The first three designs, "F," "G" and "H," are of riveted bracketless construction.

Columns "I," "J," "K" and "L" cover the last design, which is bracketed. They were built from the same plans in several different yards in Holland, Germany and Italy. The amount of welding in each of these designs differs, which accounts for some of the differences in the hull steel weight. "J" and "L" have more welding than the "D" steam design. When allowance is made for the additional steel for one bulkhead and summer tanks, the hull steel weight compares very closely with the "D" model. "I" is all-riveted and "K" has a small amount of welding. Comparing all the models illustrates the saving in steel accomplished by welding.

The first two designs of steam tankers used Scotch boilers and reciprocating engines, whereas the last three steam designs are turbine-driven through double reduction gear, using 400 pounds per square inch steam pressure at 720 degrees F.

There is a reduction of approximately 200 tons in the weight of propelling and cargo pumping machinery from the first two designs ("A" and "B") with Scotch boilers, reciprocating engines and reciprocating auxiliaries, to the later models ("C" and "D") with high-pressure steam-turbine drive and some electric auxiliaries. An additional saving of over 150 tons has been made in the last model "E," where the cargo pumps are electrically driven, allowing the elimination of a cargo or donkey boiler.

The diesel-propelled tankers (all of which, with the exception of one design, were built in Europe) show a machinery and cargo pump weight that is at least 100 tons more than for the reciprocating steam-propelled ships and 450 tons more than the latest designed turbine drive.

The steam group shows a progressive increase in speed for each new design and the Admiralty constant, which takes into consideration not only speed but displacement and power, shows a betterment for each successive design. (Model "B" is not comparable as this trial was run in deep water, whereas the other trials were held in comparatively shallow water.)

The diesel group shows an increase in horsepower in the later models over the earliest which is reflected in the

STEAM GROUP

MACHINERY PARTICULARS

Design	"A"	"B"	"C"	"D"	"E"
Type of propulsion	Steam-recip. quad. exp.	Steam-recip. quad. exp.	Steam-turb. dbl. reduct. gear	Steam-turb. dbl. reduct. gear	Steam-turb. dbl. reduct. gear
No. of cylinders	4	4			
Size of cylinders	27″ x 39″ x 56″ x 82″	27″ x 39″ x 56″ x 82″			
Stroke	54″	54″			
Designed power	3600 I.H.P.	3600 I.H.P.	4000 S.H.P.	4000 S.H.P.	4000 S.H.P.
Designed R.P.M.	75	75	75	75	75
Boilers, steaming	3 Scotch	3 Scotch	2 watertube	2 watertube	2 watertube
Total heating surface	10,558.5	10,848	6,814	6,814	5,300
Working pressure, lb. per sq. in.	220	220	400	400	400
Temperature, degrees F.	382	382	720	720	725
Donkey boilers			1 watertube	1 watertube	
Type of cargo pumps	Recip.-steam	Recip -steam	Rotary steam	Rotary steam	Main-Cent. strip-rotary electric

TRIAL DATA

Design	"A"	"B"	"C"	"D"	"E"
Displacement	18,900	19,700	20,837	20,900	21,150
Draft	27′ 0″	27′ 10½″	29′ 10⅞″	29′ 3¾″	30′ 1½″
Maximum power	4300 I.H.P.	4103 I.H.P.	4409 S.H.P. by torsion-meter	4585 S.H.P. by torsion-meter	4660 S.H.P. by torsion-meter
R.P.M. at maximum power	81.0	80.67	77.67	80.36	83.7
Speed at maximum power	13.04	13.04	13.25	13.87	14.14
Speed at designed power (from trial curve)	12.28	12.45*	12.72	13.1	13.7
E.H.P. (model test) at designed power	2,759	.....	.....	2,625	.....
Admiralty constant**	393	426	390	426	492

* Trials in deep water.

** Based upon standardization trials. S.H.P. assumed 92 per cent of I.H.P.

SERVICE DATA†

Design	"A"	"B"	"C"	"D"	"E"
Power, average	3084 I.H.P.	3102 I.H.P.	3678 S.H.P.	3953 S.H.P.	4014 S.H.P.
R.P.M. average	69.0	69.9	72.4	73.92	78.0
Speed, average	11.49	10.79	12.72	13.24	14.0
Fuel per day, average tons	32.95	33.07	29.31	29.47	27.0
Cargo tons, per round trip	13,241	13,450	13,906	14,665	15,687
Average nautical miles per round trip	3,910	7,966	4,000	3,920	3,687
Average days per round trip	14.19	30.8	13.18	12.35	10.97

† Service data are for round trips and are averaged for last three years or since commissioning. Performance is for sea passage, LV to LV.

DIESEL GROUP

Dimensions

Design	"F"	"G"	"H"	"1"	"J"	"K"	"L"
Length overall	500′ 1½″	506′ 8″	505′ 2″	506′ 8″	506′ 8″	506′ 8″	506′ 8″
Length B.P.	480′ 0″	485′ 0″	485′ 0″	485′ 0″	485′ 0″	485′ 0″	485′ 0″
Length, designed L.W.L.	494′ 11″	496′ 9¾″	497′ 9″	496′ 9¾″	496′ 9¾″	496′ 9¾″	496′ 9¾″
Breadth, molded	65′ 9″	68′ 0″	74′ 10″	69′ 9″	69′ 9″	69′ 9″	69′ 9″
Depth, molded	37′ 0″	37′ 0″	37′ 0″	37′ 0″	37′ 0″	37′ 0″	37′ 0″
Draft, summer freeboard	29′ ½″	30′ 1/16″	30′ 4¼″	29′10 7/8″	29′ 11″	29′11 1/16″	29′ 10¼″
Block coeff. (on L.W.L.)	0.75	0.744	0.692	0.750	0.750	0.750	0.750
Prism. coeff. (on L.W.L.)	0.768	0.758	0.766	0.765	0.765	0.765	0.765
Cargo tank volume, cu. ft.	651,230	688,441	712,710	738,728	738,728	738,728	738,728
Bunker capacity (17-deg. Bé. oil)	1,579	1,927	1,880	1,146	1,181	1,149	1,181
Gross tons	9,181	10,468	10,627	10,451	10,448	10,516	10,455
Net tons	5,599	6,127	6,292	6,054	6,054	6,077	6,068
Where built	U. S.	Germany	Holland	Holland	Germany	Germany	Italy
Entered service	1931	1935	1935	1937	1937	1938	1938-9

Hull Particulars

Design	"F"	"G"	"H"	"1"	"J"	"K"	"L"
Construction	Longitudinal bracketless	Longitudinal bracketless	Longitudinal bracketless	Longitudinal bracketed	Longitudinal bracketed	Longitudinal bracketed	Longitudinal bracketed
Type of hull	C.L. bhd.	C.L. bhd.	C.L. bhd. arcform	Twin bhd.	Twin bhd.	Twin bhd.	Twin bhd.
Shell construction	Riveted	Riveted	Riveted	Riveted	Riveted	Riveted	Riveted
Interior construction	Riveted	Riveted	Riveted	Riveted	Part weld	Part weld	Part weld
Interior ends, construction	Riveted	Riveted	Part weld double bottom	Part weld double bottom	Weld double bottom	Weld double bottom	Weld double bottom
Deck construction	Riveted	Riveted	Riveted	Riveted	Riveted	Riveted	Riveted
No. transverse bulkheads	16	17	17	17	17	17	17
No. pump rooms	2—midship and forward	2—midship and forward	2—midship and forward	2—midship and forward	2—midship and forward	2—midship and forward	2—midship and forward
Total rivets	968,134	.....	.....	.....	.....	.....	.....
Total welding, feet	None	None	.....	.....	.....	.....	.....

Weight Analysis

Design	"F"	"G"	"H"	"1"	"J"	"K"	"L"
Displacement, summer draft, tons	20,450	21,606	21,870	21,660	21,654	21,655	21,642
Light weight, tons	5,844	6,201	6,450	6,593	6,240	6,492	6,297
Deadweight, summer draft, tons	14,606	15,405	15,420	15,067	15,414	15,163	15,345
Ratio, deadweight to displacement	0.714	0.713	0.701	0.695	0.712	0.700	0.709
Hull steel	4,434	4,602	4,817	4,936	4,551	4,701	4,428
Wood and outfit	532	548	503	531	556	668	544
Cargo pumps and piping	180	260	280	256	314	272	331
Propelling machinery	698	791	850	870	808	851	994

better Admiralty constant. (These trials were held on various courses which makes detailed comparison difficult.)

The service data are based on performance both loaded and in ballast from light-vessel departure to arrival at light-vessel at destination. They are based on the last three years of the ship's service, or, in cases where service has been less than three years, on the service data since going into service. Designs "A," "C," "D" "E" and "F" are primarily operating in United States coastwise services with an occasional trans-oceanic voyage, whereas the other designs are operating entirely trans-oceanic. It is necessary to deduct one-half knot from the coastwise group in comparing them with the trans-oceanic group to compensate for the benefits of the Gulf Stream.

The stream group shows a marked fuel economy in the turbine drive in comparison with the reciprocating engines. This is even greater in the latest design. Considered in conjunction with the greater deadweight of the later vessels, because of savings from welding, fluted bulkheads and lighter machinery and increased speed from improved lines and smooth shell without butt straps, it can be seen that these factors reflect a major advantage to the owner.

The service data of the diesel group also show some increase in speed in the successive models. There is very little difference in the fuel consumption of these various models. The fuel consumption is just under one-half of that of the latest turbine vessel. This saving of 13 to 15 tons of fuel per day for diesel vessels requires 30 to 35 days between fueling ports to compensate for the 400 to 500 tons greater machinery weight. This greater machinery weight includes the necessary steam plant for steaming out cargo tanks, which is essential on diesel tankers.

In considering new designs of tankers, attention must be given to the maximum use of welding in conjunction with a design of internal structure of the cargo spaces which will eliminate as far as possible horizontal surfaces and pockets, thus reducing corrosion. The type of machinery must be carefully considered for the intended service so that full advantage is taken of the lightest combined weights of machinery and bunkers.

World tanker construction shows a decided increase in both speed and cargo deadweight in tankers built in recent years. The use of lighter and more efficient machinery and the higher deadweight efficiency of recent welded designs provide for these increases with little change in the principal dimensions of the tanker.

Paper read before the annual meeting of the Society of Naval Architects and Marine Engineers, New York, Oct. 16, 1939.

DIESEL GROUP

Machinery Particulars

Design	"F"	"G"	"H"	"I"	"J"	"K"	"L"
Type of propulsion	Diesel 2 Cyl. Opd. Piston, Sun Doxford	Diesel 2 Cyl. Sgl. Act. Krupp	Diesel 2 Cyl. Sgl. Act. Krupp	Diesel 2 Cyl. Sgl. Act. Krupp	Diesel 2 Cyl. Sgl. Act. Krupp	Diesel 2 Cyl. Sgl. Act. Krupp	Diesel 2 Cyl. Sgl. Act. Fiat
No. of cylinders	4	8	8	8	8	8	8
Size of cylinders	23.62″	25.59″	25.59″	25.59″	25.59″	25.59″	26.8″
Stroke	45.66″	49.21″	49.21″	49.21″	49.21″	49.21″	43.3″
Designed power	2800 B.H.P.	3600 B.H P.	3600 B.H.P.	3600 B.H.P.	3600 B.H.P.	3600 B.H.P.	3600 B.H.P.
Designed R.P.M.	80	110	110	110	110	110	110
Donkey boilers	One water-tube	3-Furnace Scotch	3-Furnace Scotch	3-Furnace Scotch	3-Furnace Scotch	3-Furnace Scotch	3-Furnace Scotch

Trial Data

Design	"F"	"G"	"H"	"I"	"J"	"K"	"L"
Displacement	19,028	21,350	21,150	21,490	21,490	21,275	21,380
Draft	27′ 2″	29′ 9″	29′ 6″	30′ 3″ FW	29′ 9″	29′ 7″	29′ 6⅝″
Maximum power	3299 I.H.P.	4200 B.H.P.*	4220 B.H.P.*	4849 I.H.P.	5003 I.H.P.	5431 I.H.P.	5667 I.H.P.
R.P.M. at maximum power	81.27	118.1	121.4	111.05	115.80	116	127.15
Speed at maximum power	11.79	13.41	13.40	12.5	12.65	13.06	14.173
Speed at designed power (from trial curve)	11.64	12.43	12.76	12.05	12.13	12.46	13.25
E.H.P. (model test) at designed power	1830	2360	2505	1940	1970	2500	2690
Admiralty constant**	401	411	441	371	384	476	500

* Averaged by indicator and fuel consumption.
** Based upon standardization trials. S.H.P. assumed 92 per cent of I.H.P.

Service Data†

Design	"F"	"G"	"H"	"I"	"J"	"K"	"L"
Power, average	2821 I.H.P.	4144 I.H.P.	3969 I.H.P.	4257 I.H.P.	4218 I.H.P.	4137 I.H.P.	4100 I.H.P.
R.P.M., average	75.8	108.3	107	107.7	108	106.5	103.4
Speed, average	10.91	11.47	11.42	11.97	12.14	12.08	11.74
Fuel per day, average, tons	11.19	14.28	13.94	14.43	14.21	14.11	13.83
Cargo tons, per round trip	13,507	14,142	14,216	13,851	14,358	13,995	14,094
Average nautical miles per round trip	4,100	8,170	7,920	8,920	8,040	9,580	8,072
Average days per round trip	15.7	29.7	29.1	31.1	27.6	33.0	28.31

† Service data are for round trips and are averaged for last three years or since commissioning. Performance is for sea passage LV to LV.

Steamship Lines and Importers

By J. F. McART

Chief, Agreement Section, Division of Regulations of the United States Maritime Commission

To obtain an accurate picture of the relationship between the importers of this country and the steamship lines engaged in foregin trade, one must begin at the time when each voyage was an individual undertaking or venture in which the importer was also the carrier, assuming the risks of the voyage as well as of the market. In addition, the merchant was essentially a pioneer and explorer.

As the variety of the products of other lands increased and their points of origin extended farther into the far corners of the world, it became apparent that specialization was required—owners of vessels must confine themselves to transportation and the merchant concern himself with the sale of his merchandise. Then carriers began to handle the shipments of a number of merchants on a single voyage, and the merchants to utilize the services of a number of carriers as suited their requirements. In the process of specialization and division of labor, the carrier assumed the delivery service of the merchant, while the merchant concentrated on the purchase and sales problems incident to the interchange of products between nations.

As operation of specialized functions became established, both the merchants and the carriers have, at times, overlooked their continuity of interest. Carriers have seized opportunities to impose rates higher than the traffic could bear, while opportunists among the merchants have, by playing one carrier against another, forced rates downward until the carriers were forced to divert their vessels to other trades in order to survive.

Ocean Conferences

As early as 1875 the regular carriers, operating in the trade from the United Kingdom to Calcutta, India, initiated joint protective action by formation of the Calcutta Conference. Uniform rates as between themselves were adopted, and the same rates were charged to all shippers, whether large or small. This arrangement did not, however, eliminate the incursion of outside or irregular tonnage into trade when cargo offerings looked good. As a result, about two years later, the system of deferred rebates was adopted.

Under this system, shippers agree to ship with conference carriers exclusively for a specified period (usually a year), and carriers agree to refund the shippers a percentage of the freight money paid by them during that period; this refund payable only if the shipper patronizes the carriers exclusively for an additional period (usually six months). Thus, a shipper having once signed cannot thereafter withdraw his patronage of the lines without suffering the loss of his rebate for at least a six-months' period. This system: Enables the carriers in many instances to keep out of the trade new carriers desiring to establish regular service, even though there may be need for such additional tonnage; also, it enables the carriers at times to maintain rates relatively higher than conditions warrant. On the other hand, this system enables the carriers to adjust their sailings and tonnage upon a sound economic basis, assuring shippers of regular, adequate service throughout the year at lower rates than would be possible if tramp or other outside irregular carriers could invade the trade.

Both the conference and the deferred rebate systems spread rapidly among carriers in other trades, although not all conferences used the deferred rebate.

Congressional Investigation

The Committee on the Merchant Marine and Fisheries of the House of Representatives was directed in 1912 to investigate the methods and practices, including agreements, conferences, pools, or other combinations, of steamship lines in both domestic and foreign trades, and to recommend what legislation, if any, it deemed advisable in relation thereto. After a very comprehensive investigation, the Committee recommended that steamship conferences be permitted to continue, subject to supervisory governmental control.

Speaking of the advantages of the Conference method, the Committee said:

> *Practically all steamship representatives who testified before the Committee, as well as a majority of the leading American exporting and importing firms who expressed their views on the subject to the Committee, contended that shipping agreements, conference relations, or oral understandings which steamship lines have effected among themselves in nearly every branch of our foreign trade are a natural evolution and are necessary if shippers are at all times to enjoy ample tonnage and efficient, frequent, and regular service at reasonable rates. . . . To the shipper they insure desired stability of rates and the elimination of secret arrangements with competitors. To the shipowner they tend to secure a dependable return on investment, thus enabling the lines to provide new facilities for the development of the trade. Furthermore, such agreements are held to furnish the means for taking care of the disability of the weaker lines, whereas unrestricted competition, based on the survival of the fittest, tends to restrict the development of the lines and in the end must result in monopoly.*

The Committee stated that nearly all the objections advanced related to the limited monopoly which the conference lines were able to exercise over trade within their respective areas, and referred, among others, to the use of fighting ships, threats of retaliatory action against shippers, granting of special rates on large quantities of freight, and to the deferred rebate system, which as previously stated, by deferring the payment of the rebates beyond the period to which the rebate applies, effectively ties the merchants to a group of lines for successive periods. Speaking of these deferred rebates, the Committee said: "In this connection, it is argued that the ordinary contract system does not place the shipper in the position of continual dependence that results from the deferred rebate system."

Shipping Act, 1916

The substantial acceptance by Congress of the Committee's recommendation is apparent at once upon a perusal of the Shipping Act, 1916, as amended. Section 14 of that Act makes unlawful the payment of deferred rebates, the use of fighting ships, retaliation against shippers, and the making of any unfair or unjustly discriminatory contract with shippers based on the volume of freight offered; while Section 15 not only permits the continuance of conferences, but exempts them from the provisions of the anti-trust laws. The supervisory governmental control of conferences recommended by the Committee as a condition to their continued existence is effected by the requirement of Section 15 that every conference or other agreement affecting the competitive relationships of carriers subject to the Act be filed with the Governmental agency charged with the administration of that Section and investing such Agency with authority to disapprove, cancel, or modify any such agreement, whether or not previously approved, that it finds to be unjustly discriminatory or unfair as between carriers, shippers, exporters, importers, or ports, or between exporters from the United States and their foreign competitors, or to operate to the detriment of the commerce of the United States, or to be in violation of such Act.

Regulation of foreign carriers—whether engaged in the import or export trade—differs materially in at least one important respect from that which is effective in our domestic or interstate trade.

Regulatory Powers of Commission

In the domestic trade, the Commission is empowered, whenever it finds a rate unjust or unreasonable, to prescribe and order enforced a just and reasonable rate. No similar power is vested in the Commission with respect to foreign rates. In recognition of the principle of comity between nations, therefore, the regulation of carriers in the foreign trade is largely limited to the prevention or correction of discrimination and prejudice, and to the practices of carriers and their treatment of exporters and importers in the United States.

Notwithstanding that the Commission has no direct control over the reasonableness of rates of individual carriers in the foreign field, if it found that the rates assessed by carriers functioning under a conference agreement are so unreasonably high as to be detrimental to the commerce of the United States, it has authority under Section 15 to disapprove the conference agreement if the rates are not adjusted voluntarily to a reasonable basis.

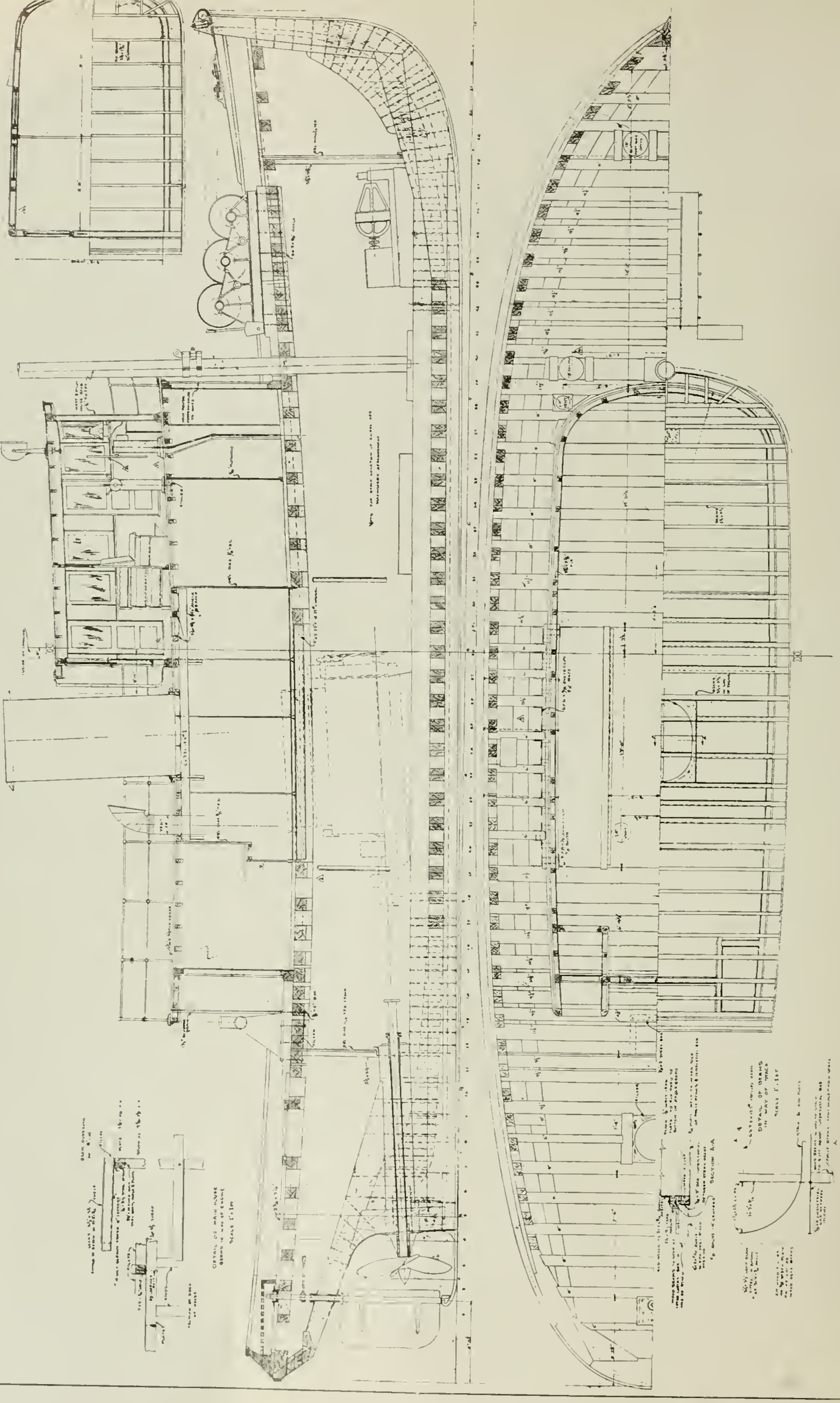
Section 16 of the Shipping Act makes it unlawful for carriers to give any undue or unreasonable preference or advantage, or to subject anyone to undue or unreasonable prejudice or disadvantage; to allow any person to obtain transportation for property at less than the regular rates and charges then established and enforced by means of false billing, false classifications, false weighing, false report of weight or by other unjust or unfair device or means; or to influence marine insurance companies to discriminate between shippers or carriers. The foregoing has been in effect since the act was passed in 1916. By an amendment approved in June, 1936, this section now makes it unlawful for any shipper, consignor, consignee, forwarder, broker or other person to obtain or attempt to obtain transportation at less than the carrier's applicable rates by means of false billing, false classifications, false weighing, false report of weight, or by any other unjust or unfair device or means. Severe penalties may be imposed for violations of any part of this section.

Extension of Conference System

At the time of the passage of the Shipping Act, practically all steamship conferences had ceased active functioning as a result of the war, and normal activities thereunder were not resumed for some three or four years. Since then there has been a gradual extension of the conference system so far as traffic to and from the United States is concerned, until as of September 1, there were some 114 freight conferences functioning under approved agreements, 61 of which exercised jurisdiction in the import trade. Thus, in a sense, the whole panorama of the relationship of shippers and carriers in the various trades to and from our country passes in review before us in the Maritime Commission, and I can honestly say that I think the picture is improving.

The carriers are becoming more and more aware of the increased responsibility imposed upon them by virtue of the exemption of their agreements from the anti-trust statutes, and are in a steadily increasing degree making such agreements the instruments of self-regulation within the law. Since the Shipping Act required filing of conference agreements as public documents, there has been, to my mind, a progressive decrease in the distrust of conferences, as such, on the part of shippers, and an increasing disposition on the part of shippers and carriers to cooperate in jointly meeting and overcoming their respective difficulties. While the present war has directly affected the conferences operating from and to the European area, the present tendency is to preserve the conferences wherever possible and carry on in the face of exceedingly difficult and trying conditions.

(Abstract of paper read before the Importers Group Session of the 26th National Foreign Trade Convention, New York, October 10, 1939.)



Inboard profile and half hold plan of U. S. Engineers tug J. S. Polhemus.

Pacific
NORTHWEST MARINE REVIEW

By CHARLES F. A. MANN

Tug J. S. Polhemus Delivered at Portland

On November 5, the husky, heavy-duty wood-hull tug J. S. Polhemus was delivered to the Portland office of the U. S. Engineers by her builders, the Seattle Shipbuilding Company.

The drawings reproduced herewith show the sturdy construction of this heavily timbered vessel. Her keel is of Oregon pine, her frame of Alaska cedar, her planking of fir and Port Orford cedar. Special arrangements were made by her designers, W. C. Nickum & Sons, consulting naval architects of Seattle, to insure long life in her hull timbers. She is said to be positively rot-proof.

Designed for day service as a dredge tender on the Columbia River, she has the following principal characteristics:

Length	84′ 0″
Beam Molded	22′ 0″
Draft	7′ 6″
Propulsion Engine	350 S.H.P.
Fuel Capacity	2200 gals.
Fresh Water Cap.	2200 gals.
Speed	12 miles an hour

The main propulsion unit of this tug is a six-cylinder, 12 inch bore and 15 inch stroke, trunk piston, direct reversing, diesel engine built by the Enterprise Diesel Engine Company of San Francisco. This engine is fitted with Brown Pyrometers which indicate temperatures for each cylinder. A Vortex silencer muffles the exhaust noises. A Westinghouse 5 K.W. generator driven by belt off the main engine charges a 100 cell 110 volt Edison storage battery of 150 ampere hour capacity and furnishes power for lighting.

The tail shaft stern bearing is equipped with a Jones Oil Bath fitting which prevents entrance of sand when working in shallow depth locations on the river.

Thrust of the propeller is taken on a Kingsbury bearing. A Coolidge designed four-blade propeller of 66 inch diameter and 36 inch pitch insures good propulsive efficiency at both towing and full speeds.

In five steel tanks adjacent to the engine room she carried 2200 gallons of diesel fuel oil and 2200 gallons of fresh water. Her compressed air storage has sufficient capacity to insure 200 complete starts of the main engine. This air supply is maintained by an Ingersoll-Rand air compressor with a capacity for 30 cubic feet per minute, driven by a 15 H.P. Westinghouse motor. Lubricating oil is treated by a De Laval centrifugal oil purifier and Cuno oil filters.

All independent auxiliaries are driven by electric motors, power for this purpose being delivered by a Westinghouse 50 K.W. generator driven by a 3-cylinder Enterprise diesel engine. This power is controlled and distributed through a Westinghouse dead front switchboard.

Motor drive auxiliaries include: A Nash fire and bilge pump; a Markey 3-drum geared winch for handling deck weights, warping ship, and taking care of moorings; and a Sperry electro mechanical steering gear.

Accommodations for a crew of seven are installed including a modern galley equipped with all the latest culinary kinks.

For fire protection, she carries a seven bottle C-O-Two fire extinguishing system covering the engine room.

California Firm Wins Graving Dock Job

Low bidder on the construction of a second huge new graving-building dock at the Bremerton Navy Yard, Puget Sound, was the Macco Construction Company and the Case Construction Company, both joint bidders of Clearwater, Calif. The joint bid was $1,976,800. This is the second new building dock for the Bremerton yard, the first one, an 1100 foot battleship building dock, is now under construction and will be ready in 1940. Other bidders were the General Construction Co., Seattle, $2,170,800 and the United Construction Co., Winona, Minn., $2,258,485. The two new building docks will be used for large battleship and aircraft carrier repair and construction.

City of Victoria a Floating Hotel

Last winter these columns reported the ignoble demise of a famous old passenger-ferry steamer, the City of Victoria, when she was sold at auction to satisfy claims of creditors of the defunct Edmonds-Victoria Ferry Co., popular thirst-quenching tourist route during prohibition days for Seattle folks and Eastern and California tourists, who sought relief in the taverns of Victoria, B. C.

This ship, the ex Chesapeake Bay steamer, Queen of the Chesapeake, after lying idle in Lake Washington, was purchased Oct. 13 by the Puget Sound Bridge & Dredging Co. and after minor changes, will be towed to Sitka, Alaska. There she will become a floating hotel to house the company employees during construction of a $3,000,000 U. S. Naval Air Base there. About 250 employees will be quartered in the old vessel. She will have her propeller removed and her boilers used merely to heat the ship. The Puget Sound Bridge & Dredging Co. also has a contract to build a Naval air base at Kodiak Island, Alaska.

The old Queen of the Chesapeake was brought to Puget Sound in 1928 and converted by the Todd Drydocks at Seattle into a luxurious passenger and ferry vessel, with accommodation for 1,500 day passengers, 75 automobiles and 265 night passengers. She is 293 x 50 x 16 ft.

American Mail Operations December 1

After almost a year of constant litigation involving the complicated business of placating various classes of creditors and stockholders, the American Mail Line of Seattle, formerly controlled by the Dollar interests, will start life anew by December 1, when one of its fleet of 5 large steamships will sail away to the Orient as a cargo liner.

Due to consistent rulings by Federal Judge Bowen of Seattle, the controlling interest of the line will be vested in the hands of the Class A creditors, mostly all Seattle firms, who hold 8 of the 9 seats on the new board of directors.

The plan of selling the steamship President Madison to Jose Conjuangco, wealthy Philippine Island business man, for $350,000 cash was approved by Judge Bowen October 24. Capt. Crispulo Onrubia of Manila, is in Seattle preparing to take the President Madison back to the Philippines. Mr. Cojuangco, associated with Dr. Nicanor Jacinto, president of the Philippine Bank of Commerce, and two of Cojuangco's brothers will form a partnership to operate the President Madison between the Philippines and the West Coast of the U. S. A.

The new American Mail line will use this $350,000 as working capital and will have the Presidents Grant, McKinley, Jefferson and Jackson with which to start operations. It is planned to trade these four ships back to the Maritime Commission later as a down payment on two modern cargo-passenger ships.

Bryce Little and Jos. H. Griffin have represented the company in the proceedings, while J. Charles Dennis, U. S. District Attorney, represented the United States. Warren Brown, Jr., of Bogle, Bogle & Gates, Seattle law firm, represented another group of creditors of the defunct line, principally the Dollar group of interests.

Seattle-Tacoma Shipyard Under Way

Construction of a two-way modern shipyard plant on the site of the old Todd Shipyards in Tacoma has been underway for some time. Contract for the new yard has been let to the General Construction of Seattle. The General Construction is headed by J. A. McEachren, who is also vice-president of the new Seattle-Tacoma company.

The new yard, where the hulls of 5 C-1 type Maritime Commission ships will be built, lies on a 70-acre site at the mouth of Hylebos Waterway in Tacoma. Work is being speeded to permit laying of the first keel right after January 1, 1940, and piling for the shipways is being driven by the Hart Construction Co. of Tacoma and Seattle.

The management personnel of the new company includes R. J. Lamont, president; J. A. McEachern, vice-president, and Walter L. Green, in charge of design. Mr. Green arrived in Tacoma October 30 to take up his residence there. Mr. Green was manager of the engineering department of the Luckenbach lines in Seattle for four years prior to leaving for his New York position in 1938. Frederic Mackle of Tacoma, who was superintendent of hull construction at the Todd Tacoma plant during the World War and prior to the Todd's closing their Tacoma yard in 1923, will take up his old position as superintendent of hull construction with the new company.

Steel has been ordered for the first two ships, to be delivered in Tacoma during the first week in January, 1940. Hulls will be built up to about 50 per cent completion in Tacoma, then towed to Seattle for the remaining 50 per cent construction and placing of machinery, principally at the Todd Seattle plant.

The new company has a contract for five C-1 diesel powered freighters at a price of $2,127,000 each.

Tug J. S. Polhemus, recently delivered at Portland.

Beachcomber's Loot

The Oriental Speed Record

A ship built by Jacob Bell at New York in 1849 for A. A. Low and Brother, to be used in the China trade, was christened Oriental. Her dimensions were: 185 feet long; 36 feet beam; 21 feet depth; and 1,003 tons, old measurement. She was not as sharp in lines as the later clippers, but was beautifully molded, with long, clean runs fore and aft. Her cost ready for sea was $70,000.

On her second voyage from New York to Hongkong Oriental did some very remarkable sailing, and made a record that stands to this day.

She sailed from New York May 18, 1850, under command of Capt. Theodore D. Palmer, and crossed the line in 25 days, logging 3,904 miles, with 264 miles as her best day. On the 45th day she was on the meridian of the Cape. On the 58th day she passed St. Paul's, and on the 71st entered Prince's Strait. Arrived at Hongkong August 8, 1850, 81 days out of New York, which is still the record.

On reaching Prince's Strait, she had sailed, by log, 14,160 miles, and by observation, 14,521 miles, an average of 204½ miles a day for the entire period. For the 33-day period from June 19 to July 21 Oriental averaged 239 miles a day, or practically 10 miles an hour. For the 11 days between July 10 and July 21 she averaged 264 miles a day, or 11 miles an hour.

This was the ship that caused the British ship operators to turn to clipper ship models. At Hongkong, on her record voyage arrival, her agents were offered the then unprecedented rate of 6 pounds sterling per ton of 40 cubic feet for taking a full cargo of tea to London. The prevailing rate was 3 pounds, 10 shillings, per ton of 50 cubic feet.

Oriental took that cargo of tea, approximating $48,000 freight. She sailed August 28, 1850, and entered the West India dock, London, on December 3, 1850, 97 days out of Hongkong, the fastest passage from China to England up to that date.

Admiralty surveyors lifted her lines while she was in the London docks, and the British press was full of articles describing the ship and her passage and the probable effects on British shipping. She was the first American ship to load in China for London direct under the then-new British free trade policy.

She immediately obtained a good charter for a round voyage between London and China, and sailed January 14, 1851. Her sailing time out was 116 days. On return she reached London November 20. The next year, arriving in Hongkong May 5, she was again 116 days out of London. On this voyage she returned to New York on December 16, 106 days out of Hongkong. She had been two years, seven months away from her home port, and had sailed 95,000 miles.

On January 27, 1853, Oriental sailed for her first and only voyage to San Francisco, and anchored in the bay May 7, 100 days from New York. She was becalmed for at least two days just 50 miles off the Golden Gate. From San Francisco she sailed to Shanghai in 41 days, and thence went to load at the newly-opened port of Foo Chow, on the River Min. After loading, she was warping down the river to sea when she struck on a ledge of rocks and sank in deep water. Crew and passengers were saved but the ship and cargo were a total loss.

Wreck of S. S. Lewis

S. S. Lewis was built in Philadelphia in 1851, and her home port was Philadelphia. Her net measurement was 1103 tons, and she was one of the first American ocean steamers to be fitted with a screw propeller. She made the trip out to California successfully, but her usefulness on the Pacific Coast was short-lived, as indicated by the following account of her loss taken from an item in a New York newspaper dated some months after the wreck:

The loss of the steamship S. S. Lewis occurred on the 9th of April, 1853, at 5 o'clock A. M., at Bolinas Bay, about fifteen miles north of the Heads, off San Francisco Harbor.

A dense fog prevailed at the time, and the ship was kept standing off and on until the mist should rise and show the position of the coast.

The ship was under easy headway, all hands literally in the fog as to where they were, when she struck upon a reef that ran out some distance from the shore, about six miles north of Bolinas Bay, and about eleven miles from the spot where the Tennessee was wrecked a short time since. Every effort was made to back her and get her off, but without avail. The sea was high, and, striking her violently, threw her broadside upon the reef, where she keeled over.

A scene of confusion and horror ensued, but order was partially restored and the boats were lowered. In these the ladies and children were first placed, and although the surf was high between the ship and the shore, a distance of about four hundred yards, they were safely landed, and the boats returned for the rest of the passengers. By 8 oclock in the morning these were all landed in safety, and by dint of great exertion the greatest part of the baggage also. The purser then started overland for San Francisco to obtain assistance. There were in all about 385 persons on board.

The passengers walked overland to the rancheria at Bolinas Bay, where tents were erected and every effort made to render their position as comfortable as possible until assistance reached them.

The account is interesting as showing the primitive conditions then prevailing. We assume that the purser, who started overland to San Francisco, would walk or ride horseback to Richardson Bay, above what is now Sausalito, and there catch a water boat or hire a rowboat to carry him to the San Francisco waterfront.

American Export Line's cargo liner Exporter on her trial trip.

CARGO LINER

Features Rapid Cargo Handling

By A. O. LOOMIS

Marine Electrical Engineer, Westinghouse Electric & Manufacturing Co.

The handling of cargo is the chief concern of operators of American Export Line's newly completed Exporter. Everything possible has been done by the shipbuilder to satisfy the requirements of the line for an ideal installation of the electrical deck equipments, which are supplied on the basis of 50 deg. C. ambient temperature.

The Exporter is the first of four fine steel cargo liners building at the Fore River plant of the Shipbuilding Division of the Bethlehem Steel Company. The other ships will be named Explorer, Exchange and Express. These ships have the following principal characteristics:

Length O.A.	473′ 1″
Length B.P.	450′ 0″
Beam Molded	66′ 0″
Depth Molded	42′ 3″
Draft Loaded	27′ 0″
Gross Measurement	6700 tons
Displacement	14,450 tons
Total Deadweight	8755 tons
Refrigerated Cargo Cap.	28,000 cu. ft.
Cargo Cap. (Bale)	508,000 cu. ft.
Normal Power	8000 S.H.P.
Sea Speed	16½ knots
Cruising Radius	15,000 miles

Eight hatches serve the seven cargo holds of Exporter. Two steel masts and six kingposts swing twelve 5-ton, four 3-ton, four 6-ton and one 35-ton booms. These booms are served by 20 Lidgerwood cargo winches driven by Westinghouse motors.

A heavy load of 35 tons is lifted with the double geared Lidgerwood winch in low gear on a 9-part line at 10 feet per minute. On the same gear ratio, with a 2-part line, 5 tons are hoisted at 70 ft. per minute. On a single line, with high gear, for the double or single geared winches, 3000 lbs. are handled at 325 ft. per minute or 2500 lbs. at 390 ft. per minute. Acceleration of the empty hook to 260 ft. per minute is effected in 4 seconds approximately.

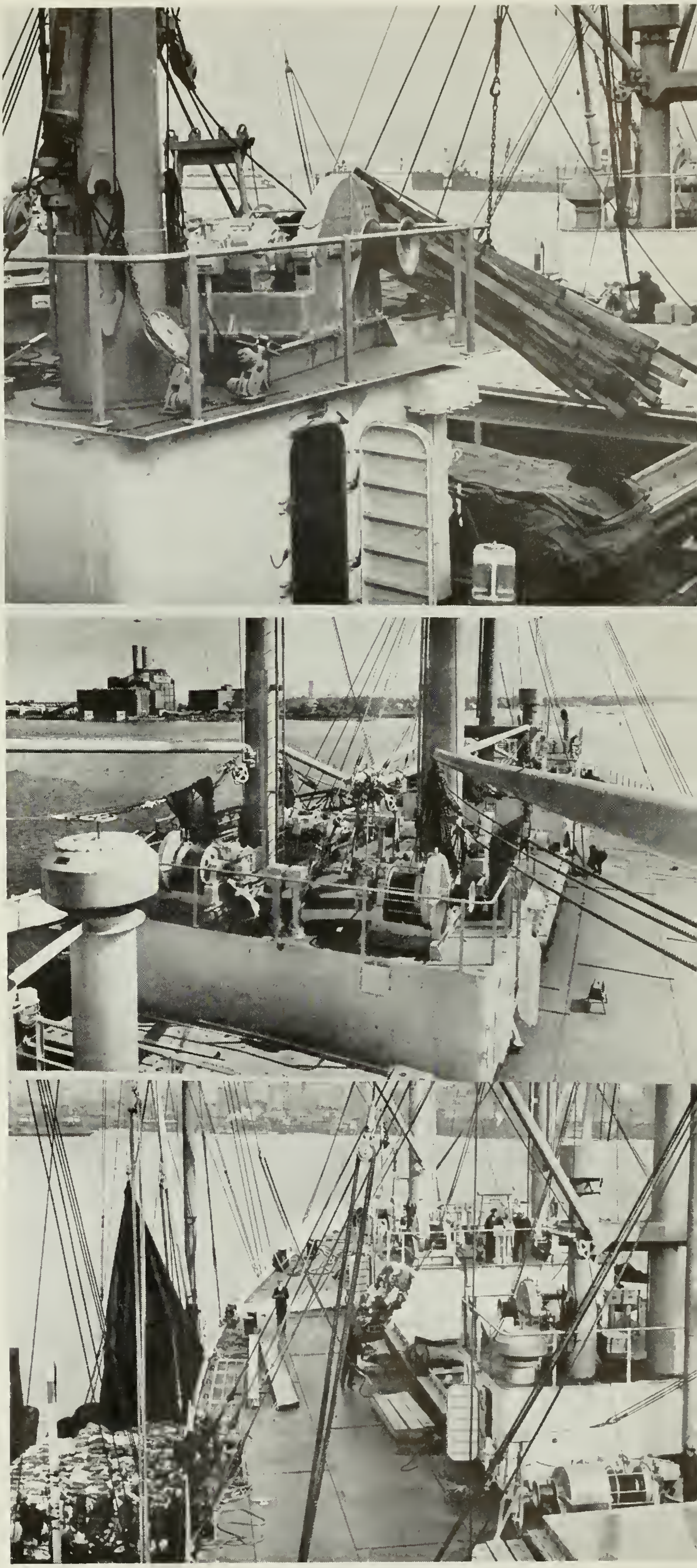
Since these vessels go to places that are hot, adequate ventilation has been supplied for the winch control houses. Two exhaust fans are fitted in the large house forward, one in each of the smaller houses. Therefore, depending upon weather conditions and the number of winches operating, the doors may be opened and the fans running. This is a great improvement over the old-fashioned form of enclosures; restricted spaces, sometimes with only one door. The illustrations show watertight port hole covers closed over the fan outlets.

Inside the deck houses rubber mats are placed in front of the control panels. At the front and rear of the panel assemblies there is sufficient space for the proper servicing of the equipment. Resistor assemblies are scattered about and not bunched; baffles between units are used; in this way localizing heating within the rooms is avoided.

In addition to the moving of the cargo, the 25 winches have various other duties, such as handling steel hatch covers and strong-backs, topping booms, adjusting chutes, setting up conveyors, moving barges, handling gangways, loading stores or just heaving on lines.

This list runs up and down the scale of all the control notches, 5 points reversing. There will be need for taking up slack, making lines taut, getting loads down quickly for accurate placing, lowering loads slowly for careful handling, hoisting and lowering loads rapidly in the clear to save time and finally handling the empty line slowly, rapidly, or very fast. Combination motor-controller curves, from actual test results, indicate the many possibilities of speed selection which the winch-man makes by the simple "push-pull" method.

Almost all of the connected loads on these vessels will be driven by Westinghouse motors with control of similar make. The proper ventilating of the cargo, the circulation of condenser cooling water, the hoisting of the anchor, the circulation of the drinking water, the steering of the vessel, the refrigeration of the stores, the repairing of parts on the machine tools; all of these results and more are accomplished electrically.



VIEWS OF CARGO WINCHES
ON S. S. EXPORTER

Upper: Winch loading dunnage boards for cargo stowage.

Center: General view, showing No. 3 cargo winch house in foreground.

Lower: General view, showing cargo winches loading cotton bales.

The electric drive hydraulic dredge S. G. Hindes.

Most Powerful Electro-Hydraulic Dredge

S. G. Hindes Gets New 2500 - H. P. Pump Motor

Late in 1927, the San Francisco Dredge Company decided that their crack dredge, S. G. Hindes, needed a drive on the pump more powerful than the 1500 horsepower electric motor then operating.

After a great deal of thought, based on 40 years of experience, a specification was prepared for a 2500-hp., 360-r.p.m., 2300-volt, wound-rotor pump motor. Some of the characteristics demanded were: high efficiency and high power factor at three-quarters load and above, without regard to the lower loading figures; large air spaces which would allow efficient forced-draft conditions under the long periods of heavy overloads which are universal in the dredging business; and inherent characteristics which would permit its use with the 1000-amp. phase advancer on hand, and would permit later installation of Kramer speed control. All of these, together with a fixed-shaft height, cramped area, and desire for pedestal bearings, tended to complicate the design.

After figures were taken from the leading motor manufacturers, the contract was awarded to the Elliott Company. The motor was delivered in the spring of 1938 but not installed until March, 1939. It was used for two months on the completion of the dredging contract for the U. S. Naval Air Station at Alameda, Calif. The performance fulfilled highest hopes, and the dredge S. G. Hindes is now considered one of the most powerful and versatile tools on the Pacific Coast.

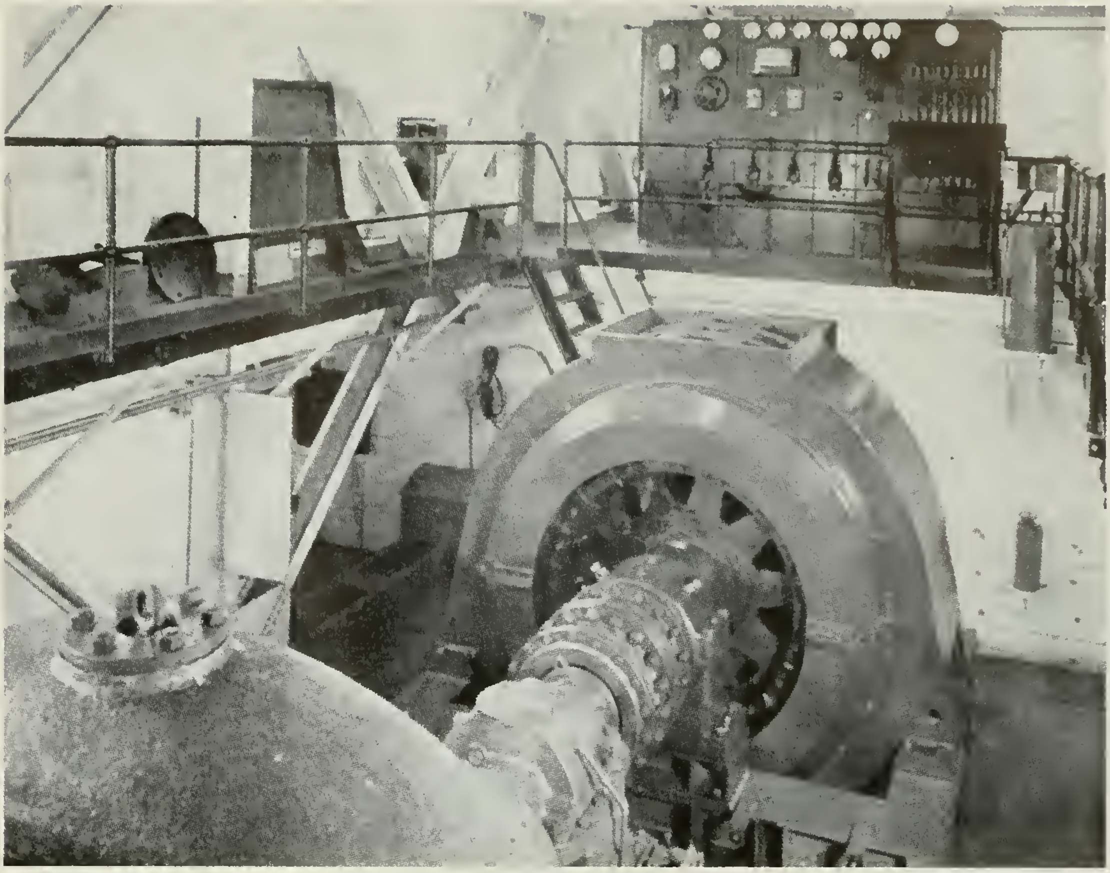
The S. G. Hindes is the flagship of the five dredges owned and operated by the San Francisco Bridge Company. She was designed by the company's own engineers and entirely constructed at their own plant, in 1930. Her hull is 136 ft. long, 40 ft. wide, by 12 ft. deep, drawing 6 ft. 6 in. of water.

The entire dredge is built around two steel trusses, 20 ft. high, running the full length of the hull, 11 ft. each side of the center line.

The 75 ft. heavy 36 in. I beam ladder is hung on one end of the hull on the trusses, while the spuds in their casings are on the other end. Most of the machinery is in the hold supported on heavy transverse keelsons attached to these trusses.

The main machinery consists of: a 24-inch dredging pump with 30-inch suction driven through a Kingsbury thrust bearing by an Elliot 2500 H. P. wound-rotor motor at 360 r.p.m.; the cutter, driven at 26 r.p.m. through triple reduction gearing and sliding sleeves with universal joints, by a 500 H. P., 450 r.p.m. induction motor; and the five drum swinging winch, driven by a 150 H. P. Ward Leonard con-

Machinery space on dredge S. G. Hindes, showing the Elliott 2500 - H. P., 2300-volt, 360-r.p.m. pump motor, and the switchboard controlling her electric circuits.



trol, d.c. motor with its own synchronous motor generator set.

The dredge takes power from shore through a four-naught conductor, 11,000 volt submarine cable carried on a separate reel barge. Power is taken aboard at this voltage and transformed in three 1000 K.V.A. transformers to 3300 volts at which all of the principal motors operate. The numerous pumps, compressors, and shop tools are handled by a secondary bank of transformers.

It is interesting to note that many of the hydraulic suction dredges on the Pacific coast are electric drive, obtaining power from shore connections. With the exception of some special machines built for dam construction, and a few dredges towed to the east coast from here, there are few other large dredges in the country using this power system.

Portable Dynamic Balancing Equipment

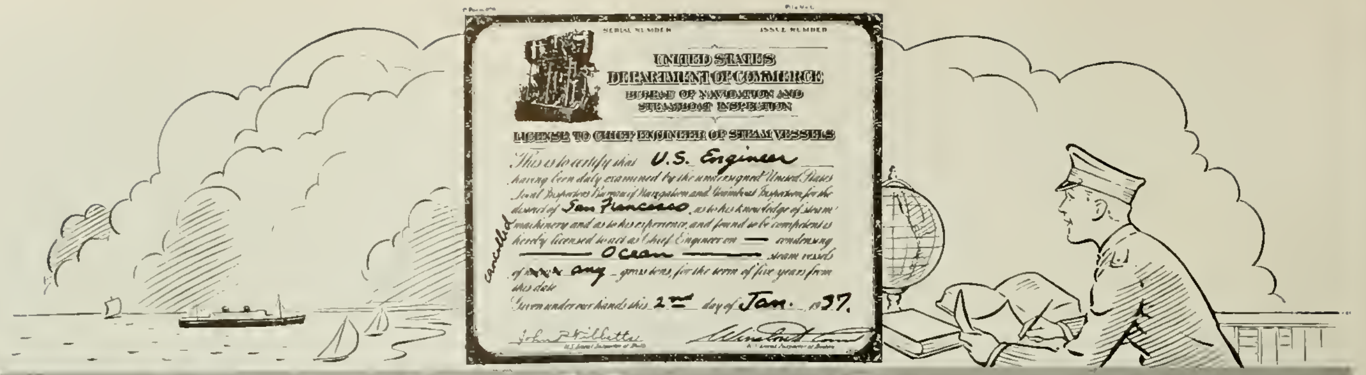
Vibration in heavy rotating machinery is a serious matter which may involve considerable expense for repairs to the vibrating machine and nearby equipment. To combat this expense, General Electric has produced a portable dynamic balancing equipment for use wherever rotating masses require balancing to eliminate vibration.

The new device is a self-contained precision instrument capable of measuring the amount and phase angle of unbalance vibration present in the bearing pedestals of a rotating machine running in its own or substitute bearings at any speed between about 600 and 5000 r.p.m.

Being portable, it permits the successful balancing of rotating equipment without the removal of the rotor from the machine and the balancing of rotors that are too heavy for previously available portable balancing machines. Because the balance is made under operating conditions this equipment improves the quality of the result, as the changes effected by load and by the foundations are included. It has also been found a time-saver in balancing auxiliary equipment in control stations and manufacturing plants, as the number of trial runs required are reduced to a minimum.

The complete equipment, packed in a single case with no batteries or external power source required, consists of a sine-wave alternator, a vibration pickup, and an instrument with its associated circuit on which mils displacement of the vibration are read.

In balancing any equipment, the sine-wave alternator spindle is inserted in a lathe center hole in either end of the rotor of the machine to be balanced, and the vibration pickup is placed against the rotor bearing. The two voltages generated in the sine-wave alternator and vibration velocity unit are applied to the measuring instrument. Then the amount of vibration in mils and the relative angular position of the high spot are determined. This measurement is made with the machine in its original condition and also with two trial weights attached. Then from these measurements calculations are made on a form sheet to determine the final weights and their location to be applied to correct the original unbalance.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UNITED STATES
DEPARTMENT OF COMMERCE
BUREAU OF NAVIGATION AND
STEAMBOAT INSPECTION

LICENSE TO CHIEF ENGINEER OF STEAM VESSELS

This is to certify that U.S. Engineer having been duly examined by the undersigned United States Local Inspectors Bureau of Navigation and Steamboat Inspection for the district of San Francisco, as to his knowledge of steam machinery and as to his experience, and found to be competent is hereby licensed to act as Chief Engineer on — condensing Ocean steam vessels of ~~xxxx~~ any gross tons, for the term of five years from this date

Given under our hands this 2nd day of Jan. 1937.

Cancelled

U.S. Local Inspector of Hulls

U.S. Local Inspector of Boilers

Your Problems Answered

by "The Chief"

"The Chief's" department welcomes questions—Just write "The Chief," Pacific Marine Review, 500 Sansome Street, San Francisco, California.

Feed Water Treatment

III BOILER SCALE

QUESTION

What are the impurities in boiler feed which give us trouble?

ANSWER

The impurities found in boiler water may be divided into three classes: Class 1, inorganic substances; Class 2, organic materials; and Class 3, gases.

Organic compounds are principally oil and products of decomposed oils, greases, packing, rags and animal and vegetable matter.

The inorganic compounds are the principal scale-forming compounds. They may be divided into two classes; those highly soluble and those of slight solubility.

The highly-soluble salts are sodium chloride, $NaCl$; sodium sulphate, Na_2SO_4, magnesium chloride, $MgCl_2$; magnesium sulphate, $MgSO_4$; and some silicates. These chemicals will seldom be found in the boiler scale, because of their high solubility. Refer to accompanying curves for solubility of the several salts, as it varies with the temperature of the water. Sodium sulphate acts as a preventive of caustic embrittlement, on which more will be said later.

The low solubility classification contains calcium sulphate, $CaSO_4$ or $CaSO_4 + 2H_2O$; calcium carbonate, $CaCO_3$; calcium phosphate, $Ca_3(PO_4)2$; calcium silicate, $CaOH_2 + 4SiO_2$; and complex magnesium silicate and calcium and magnesium aluminum-silicates.

QUESTION

What is meant by hard scale and soft scale?

ANSWER

There is no exact distinction between *hard* and *soft* scale. However, scales containing mostly calcium carbonate and little of the sulphates or silicas are generally easy to remove, are soft, and may even be washed off, or at least the mechanical cleaner removes them readily. On the other hand, scales containing mostly sulphates or silicas, or both, are hard. They will be difficult to remove even by the best mechanical means. They will be dense, will adhere to the metal, and will act as a cement or binder, and tie up in a mass all the other non-scale-forming elements and sludge. This explains why the soft scales are called *carbonate* scale and the hard ones are called *sulphate* scale.

QUESTION

How is scale formed, and why is it different from sludge or mud?

ANSWER

Scales from different waters and at different times will vary in composition, density, hardness and amount. They will show layers, which are a record of the different waters used. Scale will generally be found to contain mostly calcium carbonate, calcium sulphate, magnesium hydrate, silica and small quantities of iron and alumina.

Dr. Hall, while developing his water conditioning control, formulated this principle on the mechanism of scale formation:

"When aqueous (water) solutions, which contain substances whose solubilities increase with an increase of temperature, are concentrated beyond their saturation value, these substances deposit as sludges at heating surfaces, but as adherent scales at cooling surfaces; if their solubilities decrease with increase of temperature, the reverse is the case."

This means that substances like calcium sulphate, whose solubility reduces as the temperature is increased, form hard scale on boiler tubes but sludge on feed lines; and substances like sodium bicarbonate, whose solubility increases with temperature increase, form only sludge on boiler tubes but scale on the feed lines.

The hard or sulphate scale formation is like the setting of a cement, and not like the baking out of a clay. Quoting again from Dr. Hall:

"In the formation of scale, the main structural constituents of the scale are deposited from solution directly as scale and not as individual particles which later agglomerate and thus form scale."

QUESTION

To what extent is scale detrimental?

ANSWER

Scales of any kind on the boiler tubes are detrimental. In the normal clean tube boiler, the difference in temperature between the tube and the water is but a few degrees, even at a very high rate of heat transfer, approximately 50° F. for 10,000 B.T.U. per hour per square foot. If heat transfer is doubled, this temperature difference is doubled. With a heavy coating of scale this temperature difference may go to more than 400° F. at the 10,000 B.T.U. rate of heat transfer; and at points in the boiler where the heat rate is higher, the 800° F. differential can be easily obtained, which, added to the normal temperature, would likely bulge, if not blow, the tube.

The following table shows the loss in heat due to higher stack gas temperature due to scale:

	Heat Loss in Per Cent	
Thickness of Scale, Inches	*Soft Scale Carbonate*	*Hard Scale Sulphate*
.020	3½	3
.031	7	6
.040	8	9
.050	10	11
.062	12½	12½
.091	15	14⅓
.112	17	16

Boilers operating at high heat rates and at high pressures and temperatures are extremely sensitive to scale, and much greater care must be used to prevent scale formation. Attention is again directed to the statement made in our opening article of this series, that scale can be prevented and is not a necessary evil.

QUESTION

How does oil enter into the scale problem?

ANSWER

The presence of oil in the feed line gives the typical oil sludge or film on the boilers at the water line, but it must not be assumed that this is the only detrimental effect of oil. Oil and other organic substances mix, and in circulation are attached to the tubes and scale, where, shortly, the scale builds up around it. This makes a thicker, more porous scale. Thus, eliminating scale-forming substances reduces the ill effects of any oil that may get through.

QUESTION

How can different scales be recognized?

ANSWER

Calcium sulphate scale forms a hard, tight surface, difficult to remove. When the surface layer is scraped clean it has pure white crystalline appearance. These crystals, in a section broken off, can be seen with the unaided eye with the proper light. Needle-like crystals on the tube can be seen with a 25 or 50 power microscope. Rust, tannin or other coloring in the boiler water will not stain these crystals. They may be scraped off with a sharp tool as a fine white powder, but it requires considerable effort to break off this scale in pieces.

Silicate scales are easily distinguished by their smooth, glass-like surface, which is difficult even to scratch with a sharp tool unless great pressure is used. They break with a sharp snap. When formed on a tube, they take a smooth polish when the cleaning brush is run over them, and they look like the tube metal itself. The only sure method of determining the scale condition of a tube is to remove it and split it for examination.

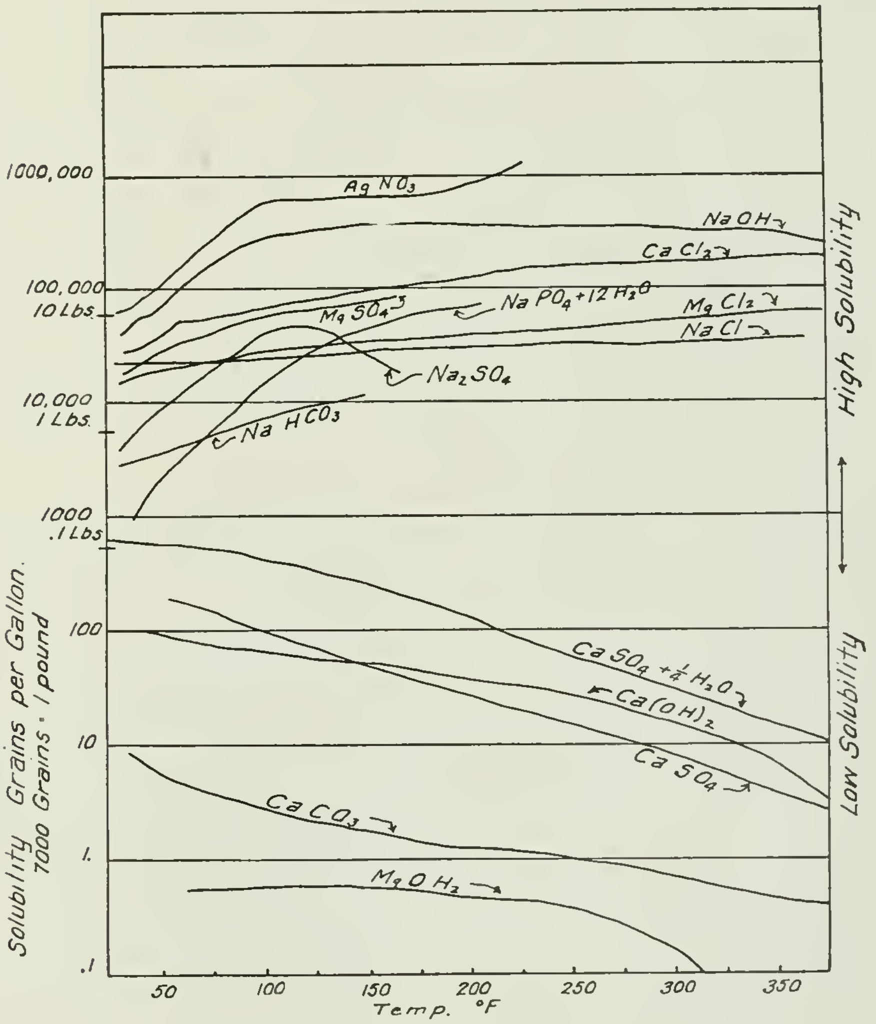
QUESTION

What are the methods of scale prevention by internal treatment?

ANSWER

The principle is to change the scale-forming impurities into non-scale-forming impurities by a simple chemical change.

In general, the methods used in scale prevention involve the adding to the feed water, or directly to the boiler water, one or more highly-soluble chemicals, such as sodium carbonate, Na_2CO_3 (soda ash, a strong alkali), or one or more of the sodium phosphates, mono, di or tri. (See list of chemicals published in the Septem-



Graph showing solubility of scale-forming chemicals at various temperatures.

ber issue, copies of which are available on request.)

Either of these will react with the scale-forming calcium sulphate to form the highly-soluble sodium sulphate and a harmless sludge consisting of either the calcium carbonate or calcium phosphate. The chemical reaction, expressed in a simplified form, is: (1) sodium carbonate + calcium sulphate goes into sodium sulphate + calcium carbonate; or, (2) sodium phosphate + calcium sulphate goes into sodium sulphate + calcium phosphate.

The removal of the complex silicates is more involved, and generally requires an excess of some magnesium salt, together with the sodium carbonate or sodium phosphate, and accurate control of the alkalinity, as the use of these chemicals tends to run the alkalinity upward. More on this phase of the subject later.

It is always necessary to have an excess of the treating chemical in the water to ensure all of the scale-forming salts being converted. This, together with keeping the alkalinity down, constitutes the elements of control of boiler water.

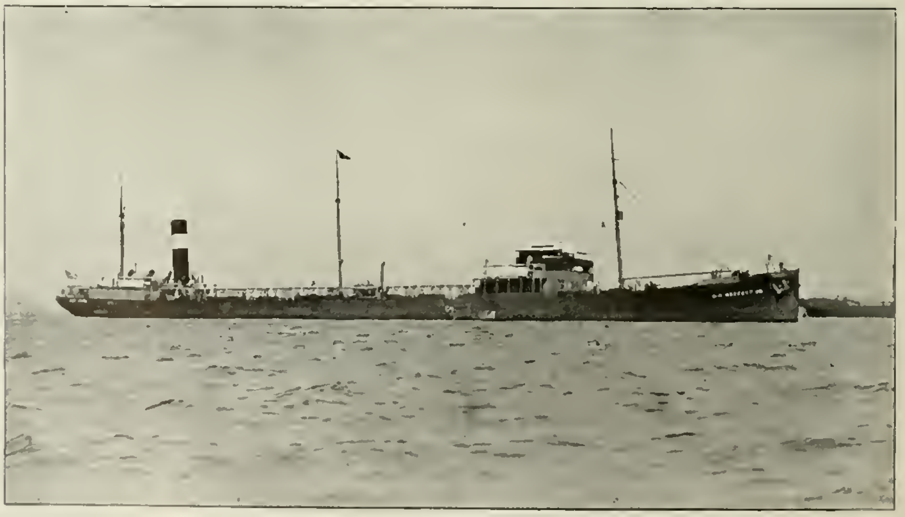
In studying the above chemical equations, it will be noted that they consist essentially of introducing two pairs of elements into the same solution, whereupon they immediately exchange partners and remain in the solution as different pairs. Note that the sodium left its former partner and joined hands with the sulphate. The carbonate, being left alone, made friends with calcium, and they go on together. Just why this exchange takes place is obscure. Chemists will explain it in words hard for us to understand. Suffice to say, experience shows us that it does take place, and we as engineers use this to change the obnoxious nature of a parasite in the water to a harmless mud.

The above is not the whole story* on boiler water treatment, as there remains the matter of dissolved gases, corrosion and alkalinity, to be treated in later articles.

Engineers' Licenses for October

Name and Grade	Class	Condition
JUNEAU		
George W. Bennett, Chief Eng.	OSS, not over 3500 GT	
1st Asst. Eng.	OSS, any GT	O
Edward Thomas Hyde, Chief Eng.	OSS, not over 3500 GT	
1st Asst. Eng.	OSS, any GT	RG
Alexander D. Smith, 2nd Asst. Eng.	OSS, any GT	O
PORTLAND		
William C. Kotkas, Chief Eng.	OMS, not ov. 750 GT	O
SAN FRANCISCO		
William W. Child, Chief Eng.	OSS, any GT	RG
Donald R. McLeod, Chief Eng.	OSS, any GT	RG
John Platzer, Chief Eng.	OSS, any GT	RG
Merl A. Johnston, Chief Eng.	OSS, any GT	RG
Samuel J. Peckett, 1st Asst. Eng.	OSS, any GT	RG
Daniel C. Singletary, 2nd Asst. Eng.	OSS, any GT	RG
Edward A. Carlson, 2nd Asst. Eng.	OSS, any GT	RG
Rudolph A. Rutz, 2nd Asst. Eng.	OSS, any GT	RG
Henry S. Williamson, 2nd Asst. Eng.	OSS, any GT	RG
John B. Obiols, 2nd Asst. Eng.	OSS, any GT	RG
Orral C. Hartwig, 2nd Asst. Eng.	OSS, any GT	O
William C. Van Loo, 2nd Asst. Eng.	OSS, any GT	O
Alfred E. Whitney, 2nd Asst. Eng.	OSS, any GT	O
Henry L. Klinefelter, 2nd Asst. Eng.	OSS, any GT	O
John F. Bell, 2nd Asst. Eng.	OSS, any GT	O
Keith B. Williams, 3rd Asst. Eng.	OSS, any GT	O
Frank Louis Du Pont, 3rd Asst. Eng.	OSS, any GT	O
SEATTLE		
Harder Andersen, 1st Asst. Eng.	OSS, any GT	RG
Howard H. Hill, 2nd Asst. Eng.	OSS, any GT	RG
William E. Peck, Chief Eng.	OMS, any GT	O
SAN PEDRO		
Edwin W. Hannay, Jr., Chief Eng.	OSS, any GT	RG
Harry H. Edwards, 3rd Asst. Eng.	OSS, any GT	O
John W. Turner, Chief Eng.	OMS, 750 GT	O

Abbreviations: GT is gross tonnage; RG is raise of grade; O is original license; OSS is ocean steamship; OMS is ocean motorship.



Motor tanker J. A. Moffett, Jr., of the Standard Oil Company of New Jersey fleet.

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* Some good books on this subject are:

Instructions for Boiler Feed Water Treatment, U. S. Navy Department; price, 5 cents.

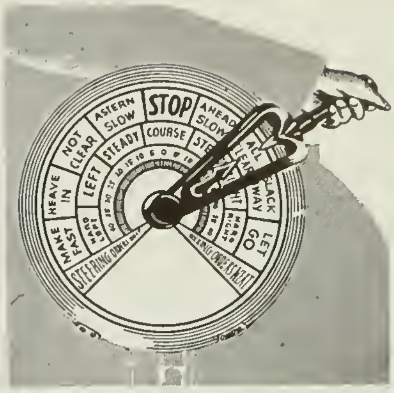
Internal Boiler Water Treatment, by W. C. Roberts; price, 25 cents.

Boiler Feed and Boiler Water Softening, by H. K. Blanning & A. D. Rich; price, $3.00.

If you desire copies of these books, write to "The Chief," Pacific Marine Review, 500 Sansome Street, sending cash or money order.

Steady as you go!

KNOWLEDGE IS THE STRAIGHT
COURSE TO ADVANCEMENT



A Department for Deck Officers

By "The Skipper"

Questions Welcomed. Just Address "The Skipper," Pacific Marine Review, 500 Sansome Street, San Francisco, California.

New Examination Requirements

Some Sample Problems

The specimen examinations for deck officers, as published by the U. S. Department of Commerce in the September Bulletin of the Bureau of Marine Inspection and Navigation, have aroused much interest. "These are printed," writes G. Gordon McLintock, principal examiner, "in order to familiarize candidates and Navigation Schools with the type of question likely to be asked in the new examinations."

A preliminary study seems to indicate that insofar as seamanship, navigation, and rules and regulations are concerned, much has not been added. However, many questions dealing with physics and applied mathematics are such as have not been set in the past.

As examples, the following are quoted:

(1.) (Algebra) — A steamer finds that by increasing her normal speed by one knot she can make a 2,640-mile passage in one day less. What is her normal speed?

(2.) (Mensuration) — The frustum of a cone and similar right cone each displaces the same amount of water. Each is 30 ins. high, and the cone has a diameter of 12", while diameter of frustum is 14". If the specific gravity of the cone is 0.9, find specific gravity of frustum.

(3.) (Dynamics) — Two bodies, nearly in the same vertical line, are dropped, the higher 6 seconds before the lower. The height from which the higher is dropped is twice the height from which the lower is dropped. Find the heights if they reach the ground together.

The first question presents little difficulty, and could be figured out by the use of algebra, as follows:

Let $x =$ Her normal speed in knots.

The number of days at same $= \frac{2640}{24x}$ (a)

Number of days at increased speed $= \frac{2640}{24\ (x+1)}$ (b)

But (b) is one day less than (a), whence

$$\frac{\overset{110}{2640}}{24x} - \frac{\overset{110}{2640}}{24\ (x+1)} = 1$$

24 cancels out of both fractions;

whence $\frac{110}{x} - \frac{110}{(x+1)} = 1$, and as $x\ (x+1)$ is the common denominator,

$110x + 110 - 110x = x^2 + x$, and thus

$x^2 + x - 110 = 0$

Factoring $(x - 10)\ (x + 11) = 0$

Therefore $x - 10 = 0$ and $x + 11 = 0$

So that $x = 10$ (or -11)

Using the positive value, 10 knots, it can be proved as follows:

Change of Masters

Steamer Tennessean: L. A. Hassell; vice, H. B. Hansen.
Steamer Richmond: C. Cagle; vice, R. M. Stall.
Steamer President Van Buren: H. W. Weaver; vice, J. C. Murphy.
Steamer Mapele: L. A. Petersen; vice, J. E. Trask.
Steamer Baldhill: S. E. Smith; vice, S. Hansen.
Steamer Point Palmas: E. H. Phillips; vice, G. T. Nielsen.
Steamer Point Estero: K. G. Landberg; vice, J. T. Larsen.
Steamer Paul Shoup: L. J. Thompson; vice, R. W. Kelly.
Steamer Associated: R. W. Kelly; vice, L. E. Hawkins.
Steamer Admiral Y. S. Williams: Fred Nystrom; vice, R. R. Drummond.
Steamer J. C. Fitzsimmons: S. S. Dunnell; vice, J. S. Christenson.
Steamer Makaweli: Fred M. Troupe; vice, J. H. Hansen.
Steamer West Shipper: Karl H. Moden; vice, E. W. Mesak.
Steamer Manoa: J. E. Dollard; vice, K. Hubbenette.

$$\frac{2640}{24 \times 10} - \frac{2640}{24 \times (10+1)} = 1$$

$$11 - 10 = 1 \text{ day.}$$

Some old-timers would probably have arrived at this answer by arithmetic, and it may be of interest to my readers to hear how. Write "The Skipper."

Next month we will work out the dynamics and mensuration problems. Meantime, we would be glad to hear from any who can and would care to send in their solutions.

While on the subject of problems, the following is one recently sent in, and "The Skipper" commends it to your attention:

Trim Problem

Your vessel will burn 190 bbls. of oil per day and use 10 tons of water per day. You are leaving San Pedro with a mean draft of 23′ 4″. You figure on being 12 days to the Canal. You want to go through the Canal on an even keel. How much drag would you give your vessel with the cargo in order to do this?

Your water is to be used from No. 4 tank, whose center is 25′ abaft amidships. Oil is to come from Nos. 6 and 7 tanks. You use 1,000 bbls. from No. 6 tank, whose center is 110′ abaft amidships, and the rest from No. 7, whose center is 155′ abaft amidships. Displacement on 23′ 4″ is 12,500 tons, and from table of longitudinal metacenter heights the Longitudinal G.M. is 560′ and the tons per inch at 23′ 00″ is 47. Oil is 6.6 bbls. to the ton; vessel 405′ on the water line. What is your draft leaving San Pedro and arriving at the Canal?

Answer

190 bbls. fuel per day × 12 days = 2,280 bbls.

2.00000........log of 1,000 (Bbls. of oil in No. 6 tank.)
—0.81954........log of 6.6 (Bbls. to the ton.)

1.18046........log of 151.5 tons of oil used from No. 6 tank.

3.10721 ......log of 1,280 (Bbls. of oil in No. 7 tank.)
—0.81954........log of 6.6 (Bbls. to the ton.)

2.28767........log of 193.9 tons of oil used from No. 7 tank.

10 tons of water per day for 12 days 120 tons.

151.5 + 193.9 + 120 = 465.4 tons of fuel and water used.

Tons per inch immersion = 47; therefore:

$$\frac{465.4}{47} = \text{by logs:}$$

2.66783........log of 465.4
—1.67210........log of 47

0.99573........log of 9.9 inches = mean change of draft.

Mean draft leaving San Pedro = 23′ 4″
Mean change of draft = 9.9″

Mean draft, arrival at Canal = 22′ 6.1″

Tons		Feet		Foot-tons
120	×	25	=	3000
151.5	×	110	=	16665
193.6	×	155	=	30054.5
				49719.5 Total Moment.

$$\frac{\text{Disp.} \times \text{G.M.}}{12 \times \text{L}} = \frac{12500 \times 560}{12 \times 405} = 1440.3$$

Foot-tons to change trim 1 inch.

$$\frac{49719.5 \text{ Foot-tons total moment}}{1440.3 \text{ Foot-tons for } 1'' \text{ trim}} = 34.5'',$$

or 2′ 10½″ total trim.

Therefore our draft leaving San Pedro will be one-half our trim applied to both fore and aft draft, as follows:

Mean draft .... 23′ 4″
— 1′ 5¼″

Draft for'd. .... 21′ 10¾″

Mean draft .... 23′ 4″
+ 1′ 5¼″

Draft aft. .... 24′ 9¼″

Longitude by Greenwich Hour Angle

Looking back over my notes recently, I came across the following method of arriving at longitude by time sight, using the Greenwich Hour Angle in the Nautical Almanac. This method has the distinct advantage of using a similar calculation for both sun and stars. "The skipper" hopes it may come in handy to one or more of his navigator friends who still use this method.

Sun

1. Enter Nautical Almanac with proper date at Greenwich and take out

Deck Officers' Licenses for October

Name and Grade	Class	Condition
JUNEAU		
Ole H. Elveness, Master	CWSS & CWMS, not over 750 GT	
3rd Mate	OSS, any GT	O
PORTLAND		
Paul West, Chief Mate	OSS, any GT	RG
SAN FRANCISCO		
Louis Van Rillaer, Master	OSS, any GT	RG
George A. Wilson, Master	OSS, any GT	RG
Morris E. English, Master	OSS, any GT	RG
Erling N. Hansen, Master	OSS, any GT	RG
Martin Solnordal, Master	OSS, any GT	RG
Lloyd W. Sheldon, Chief Mate	OSS, any GT	RG
Carl M. Haidahl, Chief Mate	OSS, any GT	RG
Jon H. Thuesen, Chief Mate	OSS, any GT	RG
William O. Yardley, 2nd Mate	OSS, any GT	RG
Glenn Gunnells, 2nd Mate	OSS, any GT	O
Emmett H. Sheridan, 2nd Mate	OSS, any GT	O
Loris W. Jenkins, 3rd Mate	OSS, any GT	O
SEATTLE		
Lewis V. Beaulieu, Master	OSS, any GT	RG
Thomas D. Luosey, Master	OSS, any GT	RG
SAN PEDRO		
Richard B. Coffman, Master and Pilot	OSS, any GT	O
Emil Harby, Master	OSS, any GT	RG
Adolf F. F. Botter, Chief Mate	OSS, 1250 GT	RG
August L. Huhn, Jr., 2nd Mate	OSS, any GT	RG

Abbreviations: GT is gross tonnage; RG is raise of grade; O is original license; OSS is ocean steamship; CWSS is coastwise steamship; CWMS is coastwise motorship.

the G. H. A. for nearest tabulated hour.

2. Turn to the table found at end of each month and take out the correction for the remaining hours, minutes and seconds.

3. The sum of these elements is the corrected G. H. A. This G. H. A. is *always a westerly hour angle.*

4. Proceed as in a regular time sight until you arrive at your Log Haversine.

5. Enter table 45 (Bowditch) with your Log Haversine and from the top of the page read in degrees, minutes and seconds (left hand column) the Local Hour Angle.

For an A. M. sight, the L. H. A. is *easterly.*

For a P. M. sight, the L. H. A. is *westerly.*

Under the L. H. A. bring down the G. H. A.

6. If both hour angles are the *same name* (both westerly), *subtract* the lesser from the greater and name the Longitude, west, *unless* the difference in the two is between 180° and 360°, in which case it is to be *subtracted* from 360° and named *east.*

If both hour angles are *contrary* names, *add* the two and name the Longitude, as above.

Note: Should the sum or difference of the two hour angles be greater than 360°, subtract 360° from it and name the Longitude, *west.*

Star

1. Enter the Nautical Almanac under the proper star and date.

2. Take out the tabulated G. H. A. for 0 hours of date of G. C. T.

3. Turn to the page immediately following the *star* section of the Nautical Almanac and take out the correction for G. C. T.

4. *Add* this correction to the tabulated G. H. A. of 0 hours.

5. Proceed from this point exactly as shown above in the *sun* instruction.

Sun Instructions: If the *star* bears east, the L. H. A. is *easterly;* and if the *star* bears *west*, the L. H. A. is *westerly.*

The same rules for addition and subtraction apply as with the *sun.*

Note: The Longitude is always named *west* unless the sum or difference of the two hour angles is between 180° and 360°, in which case it is named *east.* Should the sum or difference exceed 360°, subtract 360° from it and name the Longitude *west.*

Melville Medal Awarded For Marine Paper

The Melville Medal for original work, awarded annually by the American Society of Mechanical Engineers for the best original paper on any mechanical engineering subject presented to the Society for discussion and publication, will be awarded to Lester M. Goldsmith, chief engineer of the Atlantic Refining Company, on December 6, during the annual meeting of the Society, to be held in Philadelphia. Although the founder of this award was a naval engineer, this is the first occasion on which the medal has been awarded for a paper on any subject in the field of naval engineering.

The award of the Melville Medal to Mr. Goldsmith is in recognition of his paper on, "The High Pressure—High Temperature Turbine Electric Steam Ship J. W. Van Dyke," an 18,100-ton welded oil carrier added to the Atlantic Refining Company fleet in 1938. The paper was read by Mr. Goldsmith at the 1938 annual meeting of the Society of Mechanical Engineers. At the time of its addition to the Atlantic fleet the J. W. Van Dyke was the world's largest welded ship, a distinction it now shares with two sister ships of the Atlantic fleet, the Robert H. Colley and E. J. Henry.

Mr. Goldsmith is the first Philadelphian educated at a Philadelphia institution of higher learning to receive the Melville Medal.

As manager of the general engineering and construction department and as chief engineer, Mr. Goldsmith has been in charge of several major construction operations, including the company's new refinery at Atreco, Texas. He was responsible for the design of a number of crude oil and finished products pipe lines, and the power plants of Atlantic's three new 18,100 deadweight tons welded tankers, which embody several new features in the application of modern engineering principles to marine use.

Lester M. Goldsmith.

He is a vice president and director of the Atlantic Pipe Line Company, and a director of the Atlantic Oil Shipping Company, both subsidiaries of the Atlantic Refining Company. He is a member of the American Petroleum Institute, the American Society of Mechanical Engineers, the American Institute of Electrical Engineers, the American Society of Naval Engineers, the Society of Naval Architects and Engineers, the Society of Automotive Engineers and the American Welding Society.

The Melville Medal receives its name from Admiral George Wallace Melville, who died in 1912 after serving as Rear Admiral, Engineer in Chief, and Chief of the Bureau of Steam Engineering of the U. S. Navy. In his will, Admiral Melville left the American Society of Mechanical Engineers the bequest which has made possible the annual award of the medal. He served in the Civil War as an engineer officer on the Union sloop Wachusett, and was one of those aboard the Jeannette during her ill-fated voyage to the Arctic for the relief of the Greeley expedition. He was vice president of the American Society of Mechanical Engineers from 1895 to 1897, and was president in 1899. He was largely responsible for the introduction of reduction gearing on marine turbine drives.

On the Ways—

SHIPS IN THE MAKING

LATEST NEWS FROM AMERICAN SHIPYARDS

Pacific Coast Merchant Shipbuilding

Yard	*Location*	*No. and Type*	*Cost*
Moore Dry Dock	Oakland, Calif.	Four C-3 C.S.S.	$11,221,520
Bethlehem Union Plant	San Francisco, Calif.	Five C-1 C.S.S.	10,010,000
Western Pipe & Steel	San Francisco, Calif.	Five C-1 C.M.S.	10,635,000
Consolidated Steel Corp.	Los Angeles, Calif.	Four C-1 C.S.S.	7,560,000
Seattle-Tacoma S. B. Corp.	Tacoma, Wash.	Five C-1 C.M.S.	10,635,000
TOTAL		23 ships	$50,061,520

MERCHANT SHIPS BUILDING FOR PACIFIC COAST LINES

Yard	*Line*	*No. and Type*	*Cost*
Newport News S. B. & D. D. Co.	American Pres. Lines	Seven C-3 Comb. S.S.	$25,410,000
Sun S. B. & D. D. Co.	Standard Oil, Calif.	One Tanker	2,000,000
Bethlehem Sparrows' Point	Union Oil Co.	One Tanker	2,000,000
TOTAL MERCHANT SHIPS		32 ships	$79,471,520

Federal Launches Big Tanker

The third of three fast national-defense featured tankers, which the Federal Shipbuilding and Dry Dock Company, United States Steel subsidiary, is building for the Standard Oil Company of New Jersey, was launched off the Kearney ways at 2:20 p. m., November 4th.

The vessel was christened Esso Trenton by Mrs. Clara Esselborn, mother of Mr. Herman J. Esselborn, manager of the Operations Division, Marine Department, Standard Oil Company of New Jersey.

Esso Trenton has an over-all length of 553 feet, a deadweight capacity of over 18,000 tons at summer freeboard draft, an oil carrying capacity of over 6,000,000 gallons, and a radius of action of about 12,000 miles. One of the fastest tankers of its type, the vessel is capable of service speed in excess of 18 knots at sea.

The Federal Shipbuilding and Dry Dock Company has also under contract two smaller Federal type 13 knot tankers for the Standard Oil Company of New Jersey. It is expected that they will be launched next year.

Sun Gets Another Turbo Electric Tanker

On Nov. 4th the Atlantic Refining Company awarded to the Sun Shipbuilding and Dry Dock Company, Chester, Pa., a contract for the construction of a 19,405-ton, all welded turbo-electric tanker to be delivered late in 1940. The tanker will be the fourth of the same general type of construction to be built for the Atlantic Refining Company at the Sun yards since 1936. The vessels in this group of new Atlantic oil carriers are the

Launch of C-2 type cargo vessel Santa Ana for the Grace Line at Newport News.

SHIPBUILDERS
and ENGINEERS

BUILDING WAYS FOR WOOD AND STEEL CONSTRUCTION

Three Plants

OAKLAND PLANT
Dry Dock and Machine Shop
Dry Dock cap.: 12,500 tons
Length 450 feet
FOOT OF FIFTH AVENUE
Tel.: GLencourt 3922

SAN FRANCISCO OFFICE AND PLANT
Machine Shop
and
General Repairs
1100 SANSOME STREET
Tel.: SUtter 0221

ALAMEDA PLANT
Two Dry Docks
3,000 tons and 5,000 tons
capacity
FOOT OF SCHILLER STREET
Tel.: ALameda 0533

GENERAL ENGINEERING
and DRY DOCK COMPANY

world's largest welded ships.

The newest addition to this group will have an overall length of 543 feet 10 inches and a beam of 70 feet. Capacity will be the equivalent of 156,000 barrels, or 6,552,000 gallons. The turbo-electric engines will be designed to develop 5,000 horsepower and to provide a speed of 13.25 knots. The steam generating system will be of the high pressure, high temperature type, operating at 625 pounds pressure and at a temperature of 910 degrees, Fahrenheit. Pumping equipment will make it possible to discharge the cargo at the rate of more than 500,000 gallons an hour.

When delivered to the Atlantic Refining Company late next year the new tanker will be placed in service on the run between Philadelphia and Texas Gulf ports. It will be the eighteenth electrically propelled vessel designed by Atlantic engineers during the last 16 years, making Atlantic the owner and operator of more electrically propelled vessels than any other company in the world.

Arc Welding Saves $2400 in Rebuilding Dies

A mid-west manufacturer was recently confronted with the necessity of either building two new dies to conform with an improved product design or revamp his existing dies. New dies would cost $2800 and would require eight weeks to build. To save this time and expense it was decided to have Atomoweld Company rebuild the old dies, using a General Electric atomic hydrogen arc welder. The dies were completely rebuilt in three weeks at a cost of only $400—a saving of $2400 for the manufacturer.

The cost of rebuilding the dies included annealing the dies for welding, the welding operation, machining and normalizing to remove strains, recarburization to harden the metal, and polishing. Using atomic hydrogen welding for this type of work, metal of the same carbon content and chemical analysis as the die material can be added, and the shielding action of the hydrogen atmosphere prevents the formation of impurities during the welding operation. The built-up area showed the same grain structure and hardness as the rest of the die.

Six Oil Barges

The American Bridge Company, Pittsburgh, Pa., was awarded late in October a contract to build 6 all-welded steel oil barges for the Socony-Vacuum Oil Company. These barges will be 195 feet long and 35 feet beam, with a depth of 10 feet.

A Diesel Drive Tug to Bushey

Ira S. Bushey & Sons, Inc., Brooklyn, N. Y., report a new contract for a steel tug. The hull will be 100 feet long and 25 feet beam, with 12 feet depth. An 805 B.H.P. Fairbanks-Morse diesel will be installed. Delivery date, May 1, 1940.

This firm also have an order for a wooden construction decked barge 118 feet by 36 feet by 10 feet, for delivery on the 28th of December.

On October 8 they delivered the all-welded steel ocean-going tug D. T. Sheridan to the Sheridan Towing Company of Philadelphia. D. T. Sheridan has a 1000 B.H.P. Fairbanks-Morse diesel engine.

Two C-1 Type To Pusey & Jones

The United States Maritime Commission has announced award of a contract for construction of two C-1 design, shelter deck, steam propelled ships to the Pusey & Jones Corp., Wilmington, Delaware, at a price of $1,928,000 each.

This brings to 38 the number of C-1 cargo ships ordered since bids were opened July 11, 1939. There have now been 141 ships ordered under the Commission's construction program of which 26 have been launched.

The ships awarded to Pusey & Jones are the first C-1s of the shelter deck type. They are 413 feet overall; breadth 60 feet, displacement 11,100 tons. The other 36 are of the full scantling type, somewhat larger and longer.

Avondale Gets Barge Contract

Coast Transportation Company, New Orleans, La., awarded a contract late in October to the Avondale Marine Ways, Avondale, La., for the construction of a steel cargo barge with a watertight cargo house for Gulf coastwise service.

This barge is of the following dimensions:

Length	150 feet, 0″
Beam	32 feet, 0″
Depth	8 feet, 11″
Cargo capacity	700 tons

It is of all-welded steel construction, has 2 skegs aft, and is equipped with six watertight doors in the cargo house, and also with overhead hatches. Accommodations for the crew are fitted aft.

The design and supervision of construction of this barge are in the capable hands of V. M. Friede, N. A., New Orleans. The barge will meet the requirements of the American Bureau of Shipping and the U. S. Bureau of Marine Inspection and Navigation.

Fourteen Vessels Sold to Brazil

The United States Maritime Commission October 30 announced approval of transfer from United States to Brazilian registry of 14 vessels owned by the Moore-McCormack interests of New York, operators of the American Scantic Line and the Good Neighbor Fleet to South America.

The vessels covered in the transfer have been sold to the Brazilian government for $3,500,000 which sum will be placed in a joint account with the Commission for application to purchases of new tonnage which have been agreed upon.

The vessels involved in the sale to Brazil, with a total gross tonnage of 68,191, are:

Scannpenn, Scannmail, Scannyork, Scannstates, Mormacsea, Mormactide, Mormacsun, Mormacport, Mormacstar, Southerner, Southfolk, Southland, Southlure, Commercial Bostonian.

Under the terms of the agreement between Moore-McCormack Lines, Inc., and the Maritime Commission, the former will purchase four new C-3 combination cargo-passenger ships and charter four new C-3 cargo ships now under construction for the Commission. These vessels will be operated in the New York-South America trade.

Moore-McCormack previously contracted to buy three new C-2 cargo ships and charter three.

Commission Sells Pioneer's India Service

The United States Maritime Commission on November 8 announced sale of the American Pioneer Line's India Service to American Export Lines, Inc., for $304,000, or $76,000 per ship for the four vessels operated in that service.

Under the agreement with the Commission, the purchaser must contract before April 1, 1940, for the construction of four new vessels to be used on that trade route.

The four motorships sold by the Commission are: New Orleans, of 6172 gross tons, built 1920; Sawokla, of 5892 gross tons, built 1920; Unicoi, of 5873 gross tons, built 1920; and the Ward, of 6167 gross tons, built 1921.

The agreement provides that these vessels must be operated on the Pioneer India Service for at least two years.

The sale is made on the basis of bids from several companies submitted to the Commission on June 30 last.

Sale of this operation does not affect Pioneer Line's Far East and Australian services, which continue under a managing agent agreement with the Roosevelt Steamship Company, Inc., in New York.

Trade Literature

Axial Flow Ventilating Fans, a new 24-page, profusely illustrated catalog recently issued by the De Bothezat Ventilating Equipment Division of American Machine and Metals, Inc.

This booklet lists capacities and construction data for both volume and pressure types of the De Bothezat axial flow fans. It sets forth much technical material concerning fans and their behavior, and contains valuable duct sizing graphs, covering ducts of both round and rectangular section.

The Dahl-Beck Electric Company of San Francisco handle marine sales of De Bothezat products.

G. E. A.-2150B, a 15-page, profusely-illustrated booklet describing the mechanism and the application of the General Electric Diactor Generator—Voltage Regulators, Type GDD, for direct current machines.

G. E. A.-3228, a four-page leaflet describing and illustrating General Electric Gas Absorbers and Vent Pipes for General Electric Pyranol Transformers.

G. E. A.-3279, a four-page leaflet describing and illustrating General Electric Diactor Generator — Voltage Regulators for alternating current generators, synchronous condensers and synchronous motors.

G. E. A.-3268. Four pages of pictures and text on General Electric Air Circuit Breakers, which are described as having adequate I. C. (Interrupting capacity).

G. E. A.-3226. Sixteen pages devoted to Demand Meter problems and their solution by the General Electric line of various types of these instruments.

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Maritime Commission To Train Apprentice Seamen

A Course Calculated to Produce a Merchant Marine Personnel Better Trained and of Higher Morale

Inauguration of a program for training a limited number of apprentice seamen was announced by the United States Maritime Commission on November 6 with the acquisition of a new merchant marine training station at St. Petersburg, Florida.

The new Gulf training station provides the United States Maritime Service, the agency created by the Maritime Commission to administer its training program, with permanent facilities on the three coasts. Facilities for training licensed and unlicensed trainees on the Pacific are located on Government Island, in San Francisco Bay. On the Atlantic, at Hoffman Island, New York Harbor, there is a station for unlicensed seamen; and at Fort Trumbull, New London, Connecticut, for licensed officers.

The Maritime Service will continue its training program for seamen and officers who have been or are now employed in the merchant marine. This program contemplates training for 3,000 unlicensed seamen and 500 officers per year.

Apprentices to be trained in seafaring will be limited to 500 a year, to be divided into two classes of 250 each. The first class of 250 has already been selected and is now in training. It was chosen from 300,000 CCC enrollees by commanders of the nine corps areas of the Civilian Conservation Corps under a system worked out by Commissioner H. A. Wiley, Rear Admiral, U. S. Navy, retired, and Director Robert C. Fechner of the CCC.

Apprentices in the first class are from every state in the Union, and had been enrolled in the CCC for at least a year.

While enrolled in the Maritime Service they will receive $21.00 a month, with necessary transportation, clothing, and living accommodations. They are between 18 and 23 years of age, and were selected for physical stamina and a disposition fitting them for the rigors of life at sea. After three months, those apprentices who demonstrate qualities of leadership will be advanced to seamen, second class, at $30.00 per month.

The first three months of the year's training will be spent at the station at St. Petersburg, the next six months on a schoolship, and the last three months on a regular Coast Guard vessel. Enrollees will be assigned according to preference and aptitude to training as sailors, engineers or stewards. Upon completion of the course, the apprentices will be furnished transportation to their homes, but are expected to seek employment on commercial vessels.

The two schoolships, American Seaman and Joseph Conrad, will be permanently based at the St. Petersburg station. The first of these is a 409.6-foot converted freighter equipped with classrooms, galleys and other teaching facilities. The second is a square-rigged sailing vessel formerly used as a schoolship for the Danish merchant marine. These vessels will make regular cruises from St. Petersburg. The Tusitala, another square-rigged vessel, will be used as a station ship at St. Petersburg.

The site chosen for the Gulf station is close to the center of the city of St. Petersburg, and adjoins the municipal airport and the Coast Guard air base. It includes approximately six acres of high land and 1½ acres of submerged land, which the city has agreed to bulkhead and fill.

An expenditure of approximately $750,000 for buildings and equipment will be incurred during the first year.

Lt. Commander W. W. Kenner, United States Coast Guard, will be commanding officer of the station. Lt. Commander Charles Etzweiler, U. S. C. G., is commanding officer of the American Seaman; and Lt. M. T. Braswell, U. S. C. G., of the Joseph Conrad. The two vessels are now en route to St. Petersburg, the American Seaman bearing the 250 apprentice sailors.

Buildings at the station are expected to be ready for the second class of apprentice seamen, which will be selected in May, 1940.

MARINE DEPARTMENT
AETNA INSURANCE CO.
QUEEN INSURANCE CO.
MARITIME INSURANCE CO., LTD.
FIDELITY PHENIX FIRE INS. CO.
Commercial Hull Dept.
AUTOMOBILE INS. CO.

●

MATHEWS & LIVINGSTON
Marine Underwriters
200 BUSH ST.
SAN FRANCISCO
Offices at: Colman Bldg. - Seattle 111 West 7th St. - Los Angeles

Organization Activities

New Western Sales Manager

Caterpillar Tractor Co. has announced the appointment of **V. H. (Vic) Wallace** as Western sales manager. Mr. Wallace succeeds the late H. H. Chambers, and will have his headquarters in San Leandro, California.

Victor H. Wallace was born in a small Ohio town in 1895. When he was six years old he moved to Fresno, California, where his schooling was completed. After various small jobs there, he took the position of advertising salesman, and then advertising manager for the Fresno Republican.

Mr. Wallace left the Republican to take a position on the staff of LaSalle Extension University sales force. After a year there, he joined the Visalia Delta newspaper, as business manager.

In 1927 he became affiliated with "Caterpillar's" advertising department at San Leandro. He was almost immediately sent to Peoria, Illinois, as assistant advertising manager at that office. He was there for 5½ years, and in January, 1933, was transferred to the Western Sales Division as district representative. In that capacity, he headquartered briefly in Los Angeles, and then worked out of San Leandro, taking the territory as far north as Vancouver, B. C.

In 1935 Mr. Wallace was appointed agricultural sales manager of the Western Division, with headquarters at Spokane, Washington. He continued in that capacity until November, 1938, when he was transferred to San Leandro, to act as assistant sales manager, which position he held until the time of his latest appointment.

V. H. WALLACE

New Sales Manager for Alco Products

Effective October 18, 1939, **C. S. Patton** was appointed sales manager of the **Alco Products Division** of the **American Locomotive Company** in charge of the sale of heat exchangers, condensers, feed water heaters, evaporators, tubular equipment, code pressure vessels, fabricated plate work, water pipe and allied lines.

Mr. Patton graduated from Cornell with the degree of mechanical engineer in 1918. Eight years he was in ship building in various capacities with the Manitowoc Ship Building Company of Wisconsin, the U. S. Shipping Board, and the Staten Island Ship Building Co. In 1926 he became New York manager for the Biggs Boiler Works Co., Akron, Ohio. In 1929 he took charge of the sales of fabricated plate work for the Heat Transfer Products Co. (later acquired by the American Locomotive Company and expanded into Alco Products, Inc.). C. S. Patton later was made manager of equipment sales, Alco Products Division of American Locomotive Company, which position he has held up to his present appointment.

Marine Department Activities

To meet the present increased volume of potential business, Combustion Engineering Company has extended its departmentation of activities, involving certain reassignments in its organization.

The growing importance of the marine field, due to the present vast construction program for both merchant and naval vessels, has made necessary increased personnel in the company's Marine Department, of which **Commander H. T. Dyer** is manager; and, in view of the particular adaptability of the La Mont steam generator to marine installations, **W. H. Armacost** has been given the responsibility for engineering development in this department, in addition to his previous duties in connection with stationary equipment. **H. S. Colby**, for the past five years general sales manager, has been delegated with executive responsibility for the conduct of the company's marine business, and will devote his entire time to that work.

Donald S. Walker, formerly manager of the Philadelphia district, has been appointed general sales manager. He will be assisted by **Otto deLorenzi** and **H. G. Ebdon**, the latter formerly of the New York District Sales Office, as assistant general sales managers.

Propeller Members Hear Four Ship Operating *Authorities*

The Port of San Francisco

Tirey L. Ford
President
Frazer A. Bailey
First Vice-President
Charles L. Wheeler
Second Vice-President
Joseph R. Sheehan
Third Vice-President
Eugene Hoffman
Secretary-Treasurer

BOARD OF GOVERNORS

Frazer A. Bailey
Capt. Henry Blackstone
John E. Cushing
Kenneth K. Dawson
Fred L. Doelker
Tirey L. Ford
Hugh Gallagher
A. S. Gunn
Edward H. Harms
George Jordan
Roger D. Lapham
Ira S. Lillick
Joseph A. Moore
Joseph R. Sheehan
Charles L. Wheeler

Inaugurating the regularly scheduled monthly luncheons which will feature the Propeller Club's San Francisco activities was the luncheon-program on November 7th held in the Concert Room of the Palace Hotel.

Guest speaker *H. C. Cantelow* was introduced by *Charles L. Wheeler*, chairman of the day. Mr. Wheeler gave an inspired dedication of the club's first program, commenting on the timeliness of launching the organization's functions "when the American Merchant Marine stands on the threshold of a most promising future."

Chairman Wheeler called for 3-minute talks from *Joseph R. Sheehan* and *Frazer A. Bailey*, vice-presidents of the Club, recently back from attendance at the American Merchant Marine Conference in New York. Both of these speakers sounded encouraging notes on the accomplishments of the national convention of Propeller Clubs of the United States and on the outlook for an active 1940 in shipping affairs.

Main-speaker H. C. Cantelow, chairman of the Pacific Coastwise Conference, and Chairman of the Marine Terminal Operators of Central California, gave a highly absorbing talk on the subject:

"Charting the Course"—a Discussion of ways and means for improving the Marine Terminal Situation. His observations based on an experience of forty-five years in Pacific Coast ship operating proved decidedly interesting and worthwhile.

The attendance at this inaugural meeting sets a high mark for all future events, as 65 per cent of the entire membership responded.

The next event will soon be announced for the first week in December.

News of "The Bilge Club"

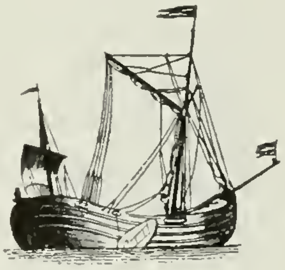
By William A. Mason
Lieut. Commander, U. S. Navy
(Retired)

Plans were discussed and committees named for the BILGE CLUB'S annual "Winter Cruise" at a meeting of the Directors Monday at the Club's headquarters in the California Yacht Club at Wilmington.

For members only, this event will be held at the California Yacht Club Tuesday evening, December 5th.

For Master of Ceremonies the Club has chosen one of its members: "Nip" McHose, well known legal light, whose reputation along those lines needs no comment. Chairmen of the various committees were selected by President Dan Dobler as follows:

Entertainment
Lloyd J. Moore
Dinner
Al Johnson and Hampton Neergaard
Publicity
Lt. Comdr. W. A. Mason
Reception
Fred Archbald, John Eidom and
Lt. Comdr. Mason
Finance
Jack Logan



Unauthorized

The publishers of Pacific Marine Review desire to notify Shipboard and other marine personnel that

ROBERT McARTHUR
(Alias Ray Palmer)

is not an authorized subscription agent of this magazine.

In this connection we acknowledge the following letter from the Marine Engineers' Beneficial Association, No. 97: **"Thank you for your letter of November 15 in which you notify us that Robert McArthur, alias Ray Palmer, is not an authorized subscription agent for Pacific Marine Review. We will post this letter on our Bulletin Board for the information of our membership."—(signed) R. Meriwether, Business Mgr.**

PACIFIC MARINE *Reviews*

FROM ERIK KRAG

Erik Krag, executive vice-president of Interocean Steamship Corporation, announces that a New Orleans office has been established. . . . **Daniel Fedoroff** is general agent for the firm, with offices in the Whitney building. This expansion move was announced "for the purpose of serving friends and clients of Interocean Steamship Corporation to best advantage."

"JIM" MURRAY PASSES

Commander W. A. Mason of San Pedro sends us word of the passing of **James J. Murray**, veteran marine superintendent at San Pedro for the Associated Oil Company. . . . "Jim" as he was known was president of The Bilge Club in 1938. He was born in Clinton, Iowa, in 1885. . . . He served the Associated Oil Company for 32 years. . . . Surviving are his widow and three young daughters.

MADRIGAL LINE

Charles A. Perkes, Pacific Coast manager of C. F. Sharp & Company, Inc., announces cancellation of the managing operators agreement between the Sharp organization and Madrigal & Company of Manila, P. I. . . . Future plans of the Madrigal Line were not announced.

L. A. HARBOR FILM

Dave Ross, publicity manager for the Los Angeles Harbor Board, has completed a sound motion picture showing the varied activities in Los Angeles Harbor. . . . The picture portrays history and growth of the port and will be available for showing at industrial and civic gatherings.

Guy Thompson

XZIT APPOINTMENT IN SEATTLE

Jack F. Govan, president of XZIT Sales Company, a visitor to the Coast during November, announces the appointment of *Guy M. Thompson* as district sales representative for XZIT (firescale and soot eradicator).

Guy Thompson came to the Seattle waterfront in 1901 and can well qualify as the "dean" of supply men in the Sound area.

He was employed at the Puget Sound Navy Yard until 1911, following several years as a "commercial traveler." At that time he joined forces with France Packing Company of Philadelphia as Coast manufacturer's representative. In '17 he was called to Philadelphia and received the appointment of Special representative, which assignment gave him broad territorial coverage.

Mr. Thompson returned to the Coast in 1920, opened his own office with the accounts of France Packing Co., Paige-Jones Chemical Company (Boiler water treatment), Flexitallic Gasket Co. (Metallic gaskets), Stewart R. Browne Mfg. Co. (Tuffite Pump valves and rings), and Kearfott Engineering Co. (Lockwood Carlisle piston rings).

Several other accounts were later added to the manufacturers' agency . . . and the recent addition of the XZIT line finds Mr. Thompson keenly enthusiastic over the sales potential for this product.

"The procedure in introducing XZIT," he tells us, "is exceedingly interesting and I am particularly impressed with the volume of repeat-order business."

PHILIPPI TO UNION OIL

Robert L. Philippi, for the past eleven years with Lord & Thomas, has been appointed director of public relations and advertising for Union Oil Company of California, headquarters, Los Angeles. . . . "Bob" Philippi was graduated from Stanford (they didn't win the big game) in 1928. . . . He takes his new post with years of industrial marketing experience behind him. . . . For the past four years with Lord & Thomas he served as account executive of the Union Oil account. . . . Coming with the announcement of Philippi's new position is the appointment of **T. L. Stromberg** as assistant director of public relations and advertising, and **R. Sneddon** as manager of publications and publicity.

AMERICAN MAIL LINE

The newly appointed board of directors of the reorganized American Mail Line announces the election of **Lawrence Calvert** as president; **Earl Doran** as vice-president; and **Samuel L. Barns** as secretary-treasurer. . . . All three are Seattle men. . . . The new officers were authorized to open negotiations with the U. S. Maritime Commission on the question of an operating subsidy.

DEPARTED THIS PORT

Captain W. E. Heppell, colorful and widely known figure in West Coast shipping, passed away early in November at San Francisco. . . . He was born in Newcastle in 1876. . . . During the World War Captain Heppell commanded the transport Agamemnon in 17 Atlantic crossings. . . . After the war he came to San Francisco and engaged in marine surveying business.

W. E. BROWN PROMOTED

L. W. Baker, general manager of the Alaska Steamship Company, announces the promotion of **W. E. Brown,** assistant general freight and passenger agent, to the position of general freight agent. . . . The duties of the position will be handled jointly by Brown and **J. D. Nelson,** the latter bearing the same title. . . . For eight years Brown was agent at Ketchikan for Alaska Steam, and prior to that time he was in service of the Copper River and Northwestern Railroad Company, and at the Alaska line's dock at Cordova.

Victor H. Kelly

TANKER NAMESAKE

Union Oil Company of California's new tanker, now being built at the Bethlehem Steel Corporation's Sparrows Point yard near Baltimore, will be named the **Victor H. Kelly,** according to an announcement just released by W. L. Stewart, Jr., vice president. Progress on the construction of the new vessel, a sister ship of the **L. P. St. Clair,** has been very rapid, and indications are that she will be ready to launch early in January, and will take her place in the service with the remainder of the Union tanker fleet about March 1, 1940.

V. H. Kelly, in honor of whom the ship will be named, has been associated with Union Oil Company for over 26 years, and is well known throughout the industry. Beginning his employ with the company in 1913 as a salesman at Tacoma, his hard work and application to his duties earned him a series of promotions in the succeeding years, through which he was elevated to the position of northern division manager. Following a successful regime in the northwest, he was transferred to Los Angeles in 1929 as chairman of the sales committee, and two years later was appointed director of sales. His election to the vice presidency took place early this year.

MARINERS CLUB HOLDS FETE

The Mariners Club (formerly Propeller Club of California) staged a most successful luncheon at the Roof Garden of the Whitcomb Hotel on Saturday, November 4th.

Honoring Charles J. McDonald, Assistant United States Inspector of Boilers, Bureau of Marine Inspection and Navigation, one hundred or more well-known figures in San Francisco's transportation circles were present to enjoy the festivities which were planned in the "Spirit of Good Fellowship."

Chairman of the Day was Frank H. Evers, American Bureau of Shipping.

We present an old friend of Pacific Coast shipping men . . . Daulton Mann, Grace Line's executive vice-president at New York. He is seen with Robert H. Patchin (left), vice-president, W. R. Grace & Co. . . . following the launching of the Santa Ana, new C-2 cargo vessel built at Newport News.

Dr. J. H. Brunnings, Fred Cordall and "Texaco Queen."

Pigeons, Belaying Pins And a Yacht Base

Here is a story which might well deserve the attention of "Believe it or not" Ripley. Over in San Rafael, across San Francisco Bay, Dr. J. H. Brunnings has created out of a hobby one of the district's most picturesque yacht harbors.

For many years Dr. Brunnings has accumulated belaying-pins from historical old wind-jammers. Along with this hobby he has turned his attention to the training of homing-pigeons. In his spare moments he has been an ardent power-cruising fan. Combining these three avocations the good doctor has developed the Marin Yacht Base, which is unique in motorboat annals because of these features:

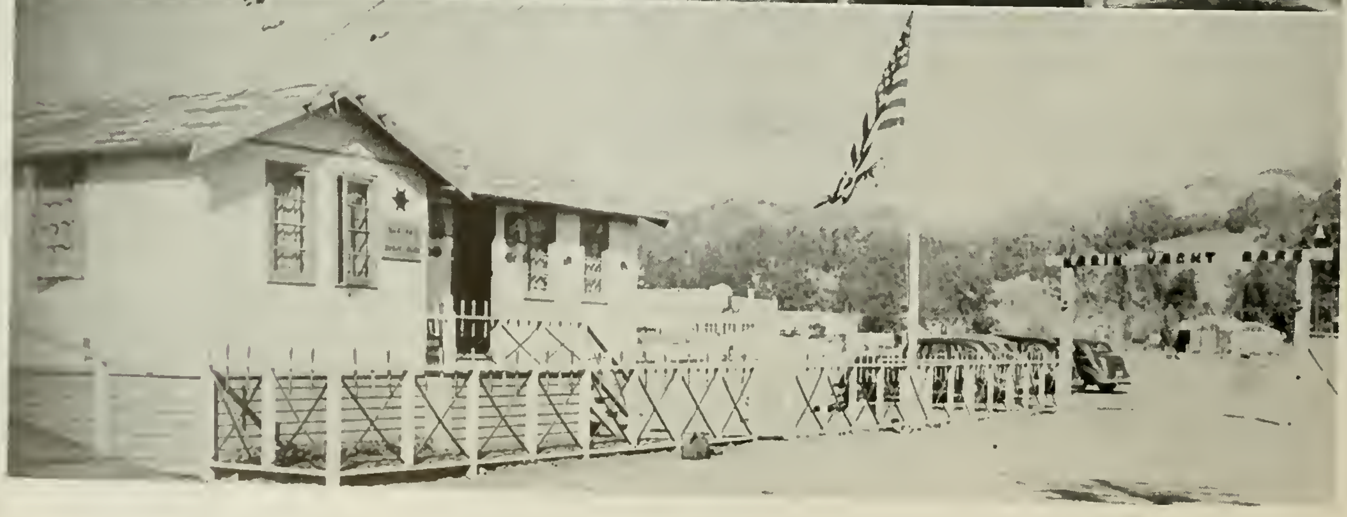
The Base operates what is probably the only "ship to shore pigeon service" in existence. Berths are available for fourteen power-cruisers. Members shoving off from these San Rafael moorings are privileged to take one to four birds along. Should the power boat run into trouble or should there be an urgent need of communicating with "headquarters" a pigeon carrying a message is released, returning to the pigeon-loft in record time.

Some of these messages have come from as far as 100 miles "off the heads."

Fred Cordall of The Texas Company tells us that in a timing experiment with Dr. Brunnings, he released a message from a 14-mile distance which brought "help" alongside within one-hour's time. Interesting to compute that the bird traveled the distance in six minutes.

Now for the belaying-pins! Our illustration shows the approach to the Yacht Base where one can detect the pins doing practical duty as pickets. Each pin is from some individual once-glorious sailing ship!

By the way, the bird in the close-up answers to the name of "Texaco Queen" honoring the policy of Marin Yacht Base in featuring Texaco lubricating products exclusively. The "harbor" is headquarters for the Tamalpais Yacht Club whose members are privileged to use the valuable Texaco Waterways Cruising Service . . . a guide for motorboat-owners in charting their trips.



SAN FRANCISCO'S *Steamship Dinner* BREAKS ALL RECORDS

Voyage fourteen of the indomitable San Francisco Steamship Dinner "on the sea of good fellowship and fraternity" set a new all-time high in the annals of these yearly events. The response from maritime men up and down the Pacific seaboard was so pronounced that the original booking of the Gold Ball Room of the Palace Hotel was transferred to the more spacious Palm Court and well over six hundred passengers came aboard.

Master of the event was *Frazer A. Bailey,* whose executive hand guided all committees along cheerful, harmonious and result-producing channels.

R. S. "Bob" Norton, chairman, and *Ray Ingram,* his first aide, headed up the entertainment committee producing the finest display of talent which we have ever seen assembled for an occasion of this or similar nature. A 3-hour show sparkled with variety, tempo and highlights to the point that all hands were attentively "on deck" till the finale.

Edward H. Harms was Secretary—and a good, efficient job did he perform! Other Committee chairmen were:

Donald Watson	*Dinner*
K. C. Tripp	*Finance*
W. C. Empey	*Membership*
Philip A. Coxon	*Reception*
Gene Hoffman	*Publicity*

The Honorary Operating Committee was comprised by Past General Chairmen: Harry Scott, General Steamship Corporation; John C. Rohlfs, Standard Oil Co.; Hugh Gallagher, Matson Navigation Co.; Thomas Crowley, Shipowners & Merchants Tugboat Company; Harry Evans, E. C. Evans & Sons; M. J. Buckley, American President Lines; R. W. Bybee, McCormick Steamship Company; Roger Lapham, American-Hawaiian Steamship Company; C. H. Chandler, Sudden & Christenson; R. W. Myers, Shipowners Association of the Pacific Coast.

Climactic was the appearance of *Charles Bulotti* and *Austin Sperry,* who gave wholeheartedly of their vocal talents when "drafted" from the audience. Every man in attendance arose and joined in the thrilling rendition of "God Bless America."

The "crew list" read like a Blue Book of "Who's Who in Pacific Coast Shipping and Shipbuilding."

The entire event was tops!

BRITISH MINISTRY OF SHIPPING IN U.S.A.

Announcement was made during late November from London of the appointment of *Sir Ashley Sparks, K.B.E.,* as representative for continental United States of the British Ministry of Shipping, with headquarters at 25 Broadway, New York City.

The function of the representative of the British Ministry of Shipping in the United States is to facilitate he movement of British ships and cargo.

Sir Ashley Sparks was Director General of the branch organization of the British Ministry of Shipping in the United States during the last war and will have associated with him as Deputies two men who served in the previous representation of the Ministry—Mr. William Boyd, C.B.E., of Messrs. Boyd, Weir & Sewell, and Mr. John Gammie of the Cunard White Star Line.

Among those who have accepted executive posts are Mr. E. P. Rees, M.C., General Manager for Furness, Withy & Company in the United States; Mr. George D. Huband, M.C., General Manager for the Cunard White Star Line at Montreal.

NEW YORK'S *Annual Naval Architects' Banquet is Mecca*

Our publisher, James S. Hines, reports a highly successful meeting on the occasion of the 47th annual banquet of the Society of Naval Architects and Marine Engineers on the evening of November 17th at the Waldorf-Astoria Hotel in New York.

Principal features of the evening were the key speech by President H. Gerrish Smith . . . the presentation of The David W. Taylor Medal . . . and the presentation of The Captain Joseph H. Linnard Prize.

We were in hopes of publishing a photograph of the banquet in this December issue of Pacific Marine Review, but the print has not yet reached us and we must forego the pleasure of presenting the familiar faces of America's leading maritime men . . . until our next edition.

This annual banquet always proves to be the Mecca of leaders in ship operating, naval architecture and marine engineering circles and the 1939 event was no exception to this tradition. Publisher Hines was greeted by friends from all maritime districts of the Nation who had made the pilgrimage to New York for this biggest event of the Merchant Marine Industry.

Administrative officers of the Society are:

President	H. Gerrish Smith
Secretary and Treasurer	J. H. King
Assistant Treasurer	C. W. Middleton
Editor	Howard H. Brown

FROM THE DAILY REPORT OF A
TIGER BRAND WIRE ROPE ENGINEER

No sooner stepped in here this morning when the super had me by the arm. "Come with me," he said, "I want to show you something."

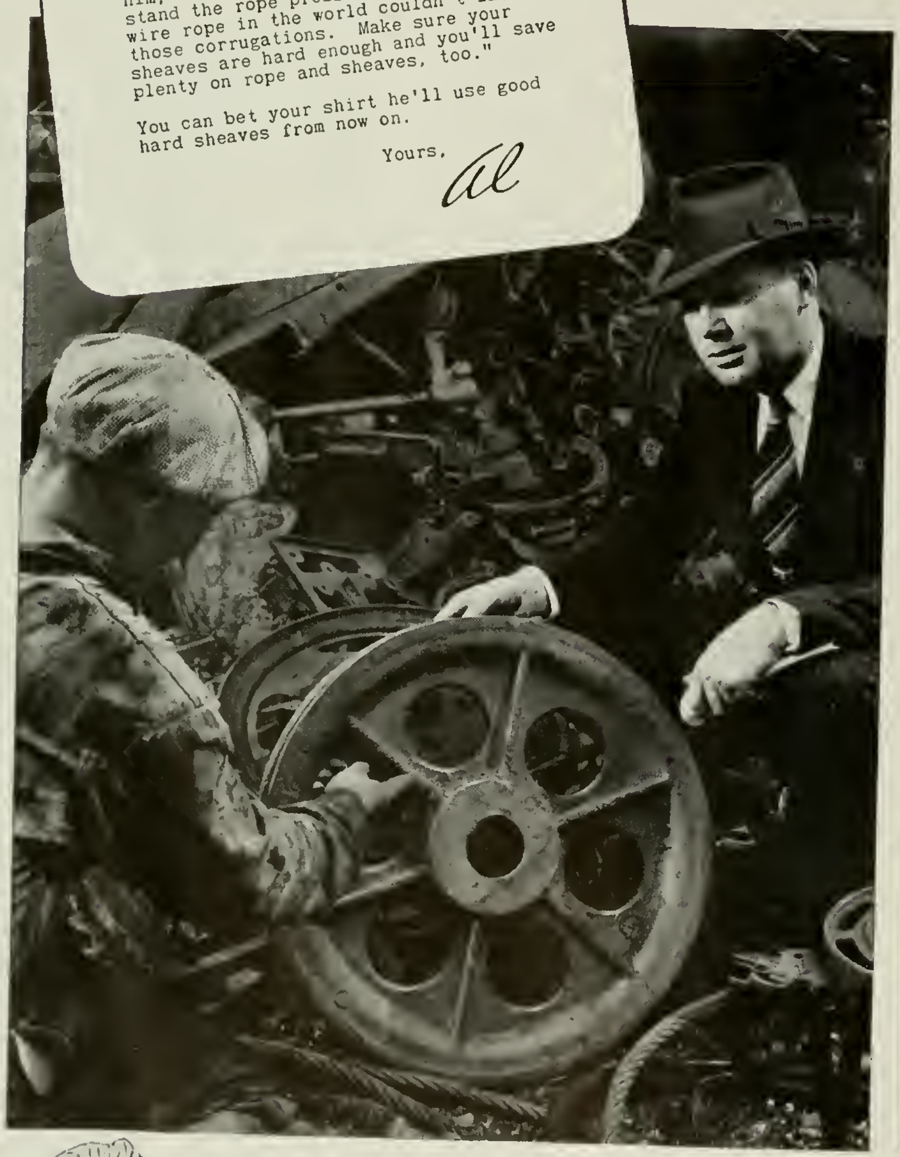
At the scrap pile he pointed at a discarded sheave. "There's a sheave that has chewed up its last wire rope," he said. "Only a few months old but it's already ruined two ropes."

I could see it was badly corrugated. "The trouble with that sheave," I told him, "is that it wasn't hard enough to stand the rope pressure. Why, the best wire rope in the world couldn't last on those corrugations. Make sure your sheaves are hard enough and you'll save plenty on rope and sheaves, too."

You can bet your shirt he'll use good hard sheaves from now on.

Yours, Al

...THAT SHEAVE HAS CHEWED UP ITS LAST WIRE ROPE!



THE material from which a sheave is made should be hard enough to withstand the wear caused by the pressure of the rope on the sheave groove. Sheaves made from too soft material not only wear rapidly, but also shorten the rope life, because the deepened grooves do not provide working clearances for the rope. The resultant pinching of the rope imposes a binding action which prevents proper load distribution, and causes excessive internal and external friction. Corrugations from strand and wire impressions further reduce rope life by accelerating wear.

Limiting values of the pressure between a rope and sheave to secure satisfactory service have been established for all common materials from which sheaves are manufactured. If you are encountering undue sheave wear, our Engineering Department will gladly help you determine the pressure on your sheaves and make money-saving recommendations based on these standards.

USS

EXCELLAY
Preformed
WIRE ROPE

AMERICAN STEEL & WIRE COMPANY
AMERICAN TIGER BRAND WIRE ROPE

COLUMBIA STEEL COMPANY
San Francisco
AMERICAN STEEL & WIRE COMPANY
Cleveland, Chicago and New York
United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

American President Lines

Regular, frequent and dependable sailing schedules for Round the World and for Transpacific services. Express-freight, passenger and refrigerator vessels.

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290 Vessels today

including the new Union Oil tanker "L. P. St. Clair", have eliminated mechanical boiler cleaning expense because their owners realize the value of the HALL SYSTEM OF BOILER WATER CONDITIONING.

The Hall Laboratories has earned the confidence and respect of every shipowner it is serving.

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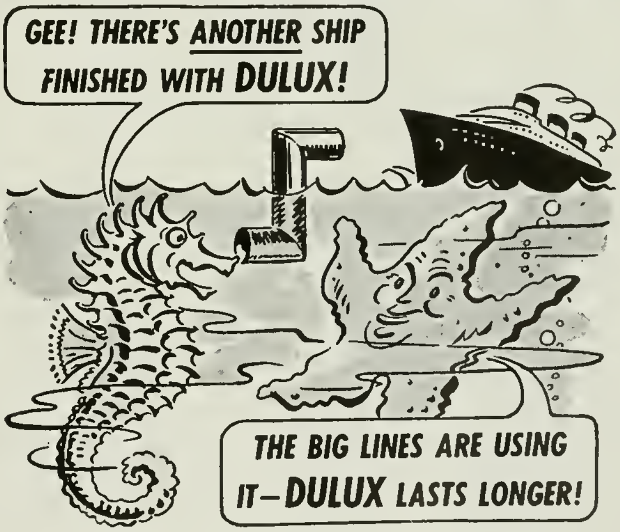

GEE! THERE'S ANOTHER SHIP FINISHED WITH DULUX!
THE BIG LINES ARE USING IT—DULUX LASTS LONGER!

● More and more ship operators are specifying DULUX because this durable finish can *take it.*

DULUX is saving money on ships in every port because it needs fewer repaintings . . . keeps paint overhead down to a lower point than ever possible before. DULUX keeps its fine appearance in spite of battering seas, hot sun, salt spray, salt air, discoloring harbor gases. It is resistant to chipping and cracking.

A Du Pont representative will be glad to give you full information about DULUX. Just write: E. I. du Pont de Nemours & Co., Inc., 235 Second St., San Francisco. 2419 South Grand Ave., Los Angeles. 525 Boren Ave., North Seattle.

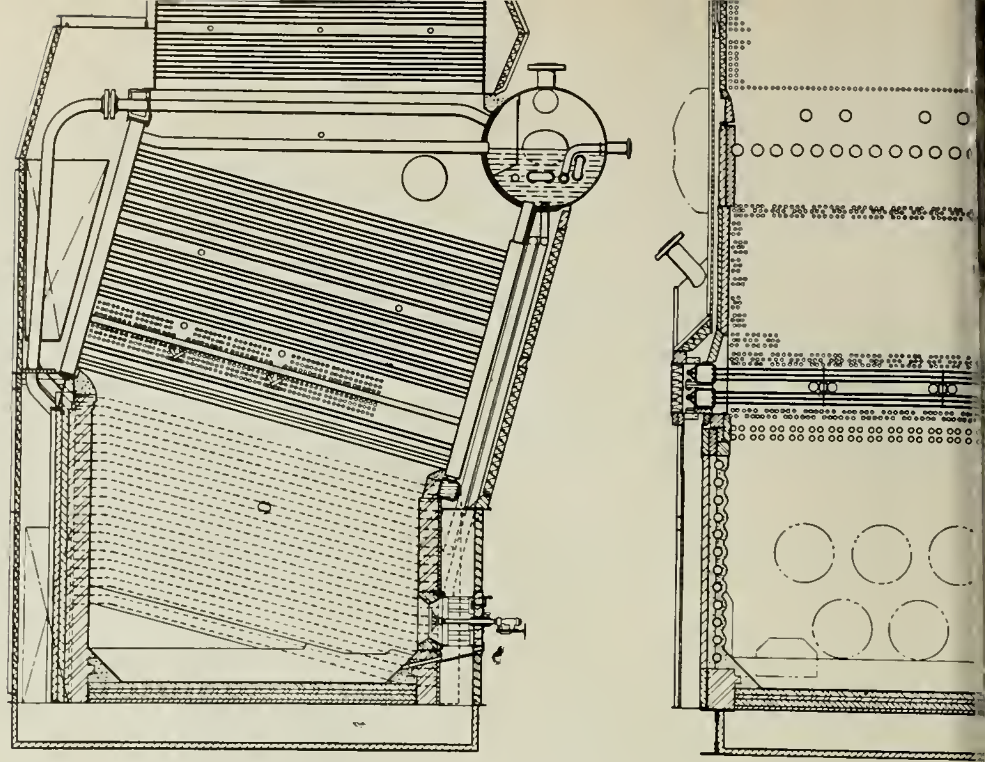
DU PONT DULUX
REG. U.S. PAT. OFF.
MARINE FINISHES

Steam Generators On New Export Line Vessels

Steam for the main propulsion turbines and other steam-drive machinery on each of the new vessels of the American Export Lines is supplied by two Babcock & Wilcox Single-Pass Sectional-Header boilers designed to generate approximately 85,000 pounds of steam per hour at a pressure of 450 pounds per sq. in. and a total temperature of 750 deg. F. at superheater outlet.

These boilers are equipped with horizontal tubular air heaters, interdeck superheaters, drum desuperheaters and oil-burning furnaces.

The furnace side-walls are water-cooled, of stud-tube construction. The front and rear walls and furnace floors are lined with Babcock & Wilcox refractory material. Five Babcock & Wilcox Decagon mechanical-atomizing oil burners, arranged for double-front forced-draft operation, are installed on each boiler on two of the vessels.


Sectional elevations of Babcock and Wilcox Sectional Header Marine Type water tube boilers.

The boilers are completely double-cased, and the air for combustion is circulated through this casing. This arrangement reduces heat loss, improves efficiency, and also maintains a comfortable temperature for the operators in the fireroom.

The boilers, superheaters and air heaters are equipped with mechanical soot blowers of Diamond Valv-in-head type.

Literature of the Industry

Acidseal Paints, a four-page catalog section on a new line of paints derived from rubber, published by The B. F. Goodrich Company and available upon request.

The subject is interesting to the marine field because these paints' unusual properties as protection against salt spray make them very effective on: marine craft bottoms and superstructures; water tank interiors; underwater protection of dock and other structures; protection of machinery or other products in cargo from effects of salt water or spray; and many other uses.

Acidseal paints, according to the manufacturer, are different from any other type of paint, lacquer or coating, with strong adhesion, corrosion resistance and elasticity as characteristics. They dry by evaporation, during which the solid material is united to metal or any other clean, dry surface with practically an inseparable bond. They have many of the elastic properties of rubber, the hard, firm film conforming to the expansion, contraction or vibration of the painted surface without cracking.

The catalog section lists: all properties of the product; directions for use of each type, with its special properties; and the different colors in which the paints are made.

Quick Selector. A new 59-page catalog, designed to help the user of electrical apparatus in selecting the right equipment for a motor or lighting circuit. Published by the Westinghouse Electric and Manufacturing Company.

Safety switches, Nofuze circuit breakers and multibreakers with ratings of from 25 to 600 amperes on alternating voltages up to 600, various types of panelboards, motor control devices, and motors are featured in successive sections of the catalog. Four pages of general application data contain NEC recommended installation practices, simplified and tabulated for easy reference.

Most sections contain tips on mounting and connecting the apparatus for convenience and safety; all sections are profusely illustrated with pictures, and are supplemented by circuit diagrams and tables to facilitate quick, accurate selection.

Organic Methods of Scale and Corrosion Control. This is the third edition of a popular publication by D. W. Haering and Company, Inc., which explains and describes the principles of organic and colloidal chemistry underlying the application of organic chemicals to water-treating problems. Since the first edition in 1936, it has come to be widely used as a text and reference work in this field.

The new edition incorporates additional information regarding the application of organic chemicals to various industrial problems, and the text includes descriptions and properties of a number of compounds not covered in earlier editions. It outlines the history of organic materials in water treating, and traces the development of this subject to present-day applications. Chemical principles and theories are explained simply in understandable language.

EO. E. SWETT & CO., *Engineers*

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NSOLIDATED ASHCROFT
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onsolidated Safety Valves, Ashcroft Dura-auges, Hancock Valves, American Tem-erature Instruments.

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TERNATIONAL, INC.
efrigeration and Air Conditioning Equip-nent.

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Centrifugal and Steam Pumps for All ervices.

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Reducing Valves, Pump Governors and Control Specialties.

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MARINE EQUIPMENT

Evaporators - Oil Heaters - Oil Coolers - Grease Extractors - Water Heaters
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INCHES, WINDLASSES,
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KEY all-welded steel. totally sed Steam Capstan with En- and Gearing running in oil. upplied to the U. S. Navy.

anufactured by **Markey Machinery Co., Inc.**
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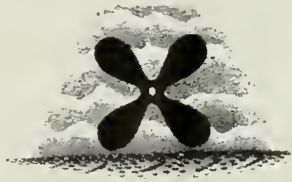
MARINE AUXILIARY MACHINERY



Manganese Bronze **Propellers**

"Cunningham" Air and Steam
WHISTLES

DORAN COMPANY
Manufacturers
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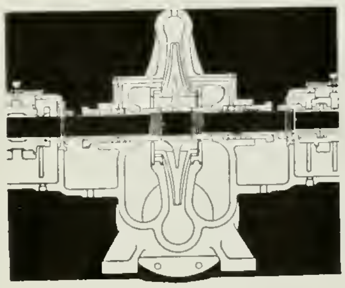
10 YEARS or 10 Minutes . . .



THEY BOTH PROVE THAT WARREN PUMPS DO A JOB

A ten minute check into the design and construction of any Warren Marine pump will give you plenty of sound evidence that Warren pumps keep power consumption and maintenance costs down. But there's another, better way to judge Warren pumps: by their long records of service on leading ships. Write "Warren" into your pump specifications.

WARREN Pumps

WARREN STEAM PUMP COMPANY INCORPORATED, WARREN, MASSACHUSETTS

MAIN STREET · SUTTER 8800 · SAN FRANCISC

New Danish East Asiatic motorship Korea.

Latest East Asiatic Motorship

The continued advancement in design and performance of the modern motor vessel is evidenced by the recent launching of the M.S. Korea by the Danish East Asiatic Company of Copenhagen.

Combining luxury in appointments and facilities for a limited number of passengers with an adequate cargo and reefer capacity, this latest type freight and passenger vessel is the newest to join the company's fleet of twenty-five operating motor vessels.

The M.S. Korea, of 510′ 10″ overall length, was built by the East Asiatic Company at the Nakskov Shipbuilding Company yards, the latter being a subsidiary of the Danish shipping and trading firm. The Korea is 9,945 gross tonnage and has a capacity (bale) of 712,900 cubic and (grain) 784,350 cubic feet. Refrigerator space is 1,495 cubic feet net. Her speed loaded is 16 miles per hour, and she is powered by diesel engines of 11,000 horsepower.

A typical single bedroom.

A corner of the dining saloon.

This new vessel is classed in British Lloyd's as + 100 A.1. and carries twelve first class passengers, having four double cabins with and without private bath and four single cabins without private bath.

Following her recent successful trial runs, the Korea is scheduled to enter the Scandinavia to Australia service, serving Oslo, Hamburg, Sydney and Brisbane.

The East Asiatic Company pioneered in the development of the ocean-going motor vessel, having built the first noteworthy motorship, Selandia, in 1910-11. This diesel-powered ship was in service for twenty-five years, and was sold a year ago. The company continues to replace its older vessels upon completion of the new craft, which are almost continuously under construction.

Builders of Distinction

CHOOSE A-E-CO EQUIPMENT FOR 19 SHIPS

Sun Shipbuilding & Drydock Company
★ CIMARRON
SEAKAY
ESSO NEW ORLEANS
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MORMACHAWK
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Bethlehem Steel Company
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★ L. P. ST. CLAIR
★ MOBILFUEL
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Ira S. Bushey & Sons, Inc.
★ CHAPLAIN
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Ingalls Iron Works Co.
★ ELM
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Pusey & Jones Corporation
★ CHESTER HARDING

Spedden Shipbuilding Co.
★ STEPHEN F. AUSTIN

St. Louis Shipbuilding & Steel Co.
★ ST. LOUIS SOCONY

★ Distinctive Ships. All others are sister ships.

Dependable A-E-CO deck auxiliaries again dominated this year's distinctive ship selections of Marine Engineering and Shipping Review. Ten of the twenty ships reported, and 9 sister ships, were A-E-CO equipped.

Whether you judge A-E-CO by its position in this impartially picked fleet or take a vote among American shipbuilders, owners, and architects at large, we believe you will find *that*: in the 13 years of distinctive ship selection, and in the 61 years before, A-E-CO equipment has always demonstrated its reliability at sea.

A mere listing of A-E-CO equipment on American ships over the last 75 years would completely fill all the editorial pages in November Marine Engineering & Shipping Review. If it's A-E-CO, it's O. K.

Other A-E-CO Products: Lo-Hed Hoists, Hele-Shaw Fluid Power, Taylor Stokers

Pacific Coast Representative:
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AMERICAN ENGINEERING COMPANY
2450 ARAMINGO AVENUE, PHILADELPHIA, PA.

HUNT-SPILLER GUN IRON

Solves a Big Problem in Steam and Diesel Operation

Hunt-Spiller Air Furnace Gun Iron Cylinder Liners, Pistons, Piston Rings and Heads will help you to solve the major problem of wear in Steam and Diesel Operation.

Extending the period between renewals, this wear-resisting material is helping many operators to obtain maximum efficiency, minimum fuel consumption, and low maintenance costs.

Skilled metallurgical control and foundry practice insures constant uniform material.

Regardless of age, make or design of engine, HUNT-SPILLER AIR FURNACE GUN IRON applied to your cylinder parts will produce maximum efficiency and reduce renewals.

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Oakland, Calif.

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16 California Street
KE-1142
San Francisco

HUNT-SPILLER Air Furnace GUN IRON

Variable-Voltage Planer Drive

A new variable-voltage drive for reversing planers, recently announced by General Electric, offers the advantages of wide speed range, extremely fast acceleration and deceleration, high cutting efficiency, accuracy in stopping, and a very simple system of control. In addition, the equipment gives independent selection of cut and return speeds, throughout the entire speed range if desired, together with a maximum number of strokes per minute on all lengths of stroke.

Tests have shown that production increases ranging upwards from 25 per cent may be realized with the use of this new drive on modern planers.

The drive itself consists of a direct-connected planer drive motor and an independent motor-generator set. So far as the control is concerned, a maximum of nine contactors and relays constitute all operating devices on the control panel. Table speeds up to 240 feet per minute can be obtained by using suitable gear ratios in the planer.

Both the rotating equipment and its control are designed to operate with very low maintenance costs. The rotating apparatus has excellent commutation characteristics and, because of low armature inertia, operates with low current peaks. The small amount of current handled by the control equipment results in little or no contact burning.

Seatrain Expansion Equipment

The fourth terminal of Seatrain Lines, Inc., under construction at Texas City, Texas, will transfer freight cars to its three special seagoing ships. This new terminal will be equipped with G-E motors and control, as are the ones in Havana, New Orleans and Hoboken. Each of the three ships carries 100 freight cars in its holds, handled through deck hatches. Four to five minutes are required to load a car from the yard to the ship by means of a G-E equipped Shepard-Niles crane.

The crane will be powered by two 300-H.P. wound-rotor hoist motors of rolled steel construction, and a 100-H.P. totally enclosed bridge motor and complete magnetic control with dynamic braking. This crane will be somewhat more powerful and faster than the previous installations in other ports.

Seatrain Lines is building two more special ships for transporting freight cars, and these two ships will also be G-E equipped, making a total of five vessels, four of which will have General Electric propulsion and auxiliary equipment.

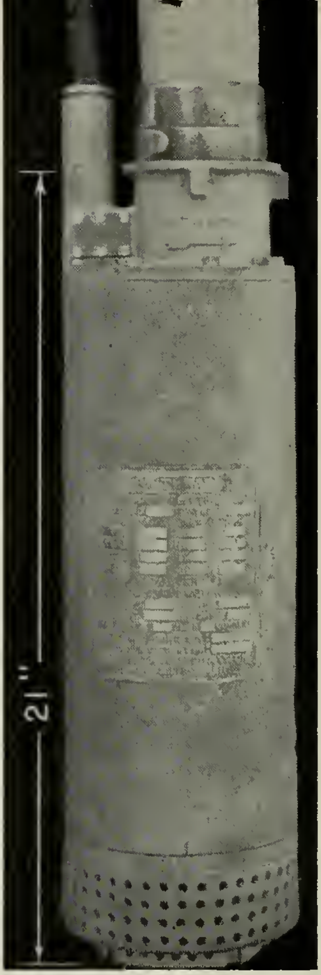
Literature of the Industry

The Balanced Monobloc, W-321-B14, an eight-page, black and red brochure published by the Worthington Pump and Machinery Corporation, to announce the latest improvement to their line of Monobloc motor-driven centrifugal pumps. This new Monobloc combines the pump bracket, the head of motor on the pump side, and the support base all in one casting.

Publication W-322-B1D accompanies the above and describes Type G of this Monobloc line. This type carries a hydraulically-balanced 2-stage centrifugal.

Catalog 78, The Lunkenheimer Co. A book of 136 pages describing, illustrating and listing the complete line of: bronze, iron and steel valves; boiler mountings; lubricating devices; oil and grease cups; whistles; cocks; and fittings.

Technical data are completely tabulated, and include: weights and dimensions of products American standards for pipe threads and fire hose couplings; conversion tables; allowable working pressures; standard flange dimensions; pipe dimensions; flange stud-bolt dimensions; and thermodynamic properties of steam.



A New Submersible Pump

One of the outstanding developments made possible by the Sawyer standard two-pole, polyphase motor design is a portable, submersible pump built by the Sawyer Electrical Manufacturing Company of Los Angeles. This pump, marketed under the name Sawyer Smithway, is meeting with favorable reception in the marine, construction and chemical industries.

Because of the special patented Sawyer motor construction, weight and overall dimensions have been cut nearly 50 per cent. The pump may be operated either submerged in the liquid being pumped, or unsubmerged with a foot valve attachment. The pump motor is water jacketed, and, where water is being pumped, this materially increases the cooling capacity of the water jacket.

Other developments include totally-enclosed motor, 4½ H. P. at 3600 r. p. m., available in either 220 volt or 440 volt, 3-phase 60 cycle. The pump's capacity varies from 220 gallons per minute at a 25-foot head to 60 gallons per minute at a 90-foot head. Its overall length is 21 inches, and its overall diameter, 6¼ inches. The total unit, less foot valve and cable, weighs only 80 pounds.

F-M DIESEL CASE HISTORIES

SWITCH FROM STEAM TO DIESEL INCREASES PULLING POWER

450-HP Fairbanks-Morse Diesel Outpulls 450-HP Steam Engine 4250 Lbs. in Towing Test!

After careful comparison of the cost of steam and Diesel power, Ralph E. Matton & Sons of Waterford, N. Y., owners of tug "Ralph E. Matton," decided to convert from steam to Fairbanks-Morse Diesel power.

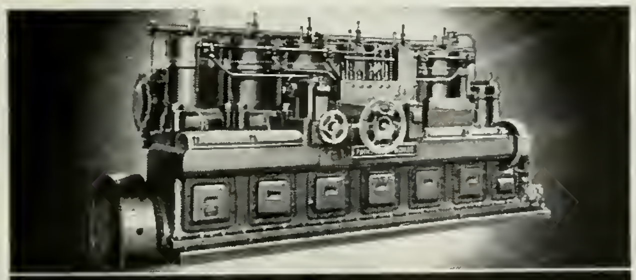
"We were greatly surprised," said Mr. John E. Matton after conversion was made, "to find that on the towing machine, we pulled 4250 pounds more with the Diesel than with the steam engine wide open, and both plants were rated at approximately 450 hp each."

The "Ralph E. Matton" is a stout 88-foot craft with 22-foot beam, drawing 9' for'ard and 10'6" aft when fueled and ballasted. Her propulsion power is a 450-hp 14 x 17 Model 35-E Fairbanks-Morse Diesel. Auxiliary power is furnished by a 10-hp Model 36-A F-M Diesel.

Whether you build or convert—the world's broadest Diesel experience is at your service without cost.

Back of that experience is the right size and type of Diesel engine for your specific needs. It is not necessary to make any compromise whatever when you come to Diesel Headquarters. Fairbanks, Morse & Co., Department 109, 600 S. Michigan Ave., Chicago, Ill. Branches with service stations in principal ports.

7643-OA27.523



FAIRBANKS-MORSE

DIESEL ENGINES
PUMPS
ELECTRICAL MACHINERY
FAIRBANKS SCALES
RAILROAD EQUIPMENT

WATER SYSTEMS
WASHERS-IRONERS
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STOKERS
AIR CONDITIONERS

Diesels

IN SHOWERS . . .
IN GALLEYS . . .

Alundum Tile Floors, Non-slip When Wet

FOR every place aboard ship where there is a slipping hazard there is a suitable Norton Floors product — Alundum Tiles and Aggregates. Each product provides dependable walking safety — a surface that will not wear slippery — whose effectiveness is not lessened by water.

For lavatories, showers, around swimming pools and similar places there is Alundum Ceramic Mosaic Tile.

In galleys Alundum Floor Tile in the 6 x 6" size is most used.

Terrazzo is made non-slip when wet with Alundum Aggregate.

NORTON COMPANY
WORCESTER, MASS.

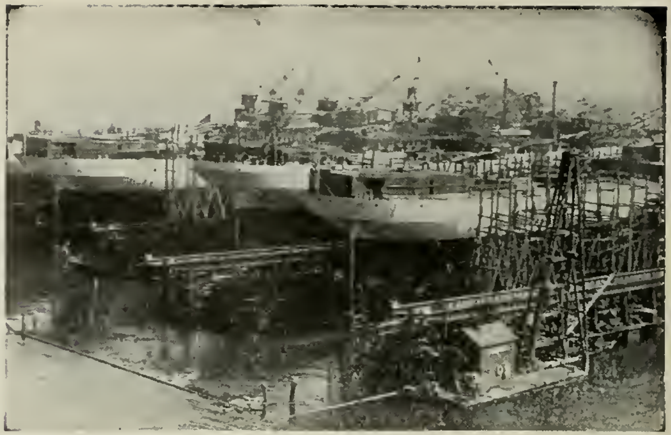
T-458

NORTON FLOORS

ALUNDUM TILES — TREADS — AGGREGATES

Building in American Yards

Direct Reports from Yards as of November 1, 1939



Pacific Coast

BETHLEHEM STEEL COMPANY, INC.

Shipbuilding Division
(Union Plant)
San Francisco

NEW CONSTRUCTION:

Five C-1 cargo vessels for U. S. Maritime Commission. Full scantling steam propulsion type.

One pineapple barge 175′ x 45′ x 11′; 650 gross tons; for Young Brothers, Ltd., Honolulu, T. H. Contract dated October 4, 1939.

DRYDOCK AND ROUTINE REPAIRS: Fr. Str. San Francisco, Margaret Schafer, Admiral Y. S. Williams, Mariposa, Peter Lassen, Richmond, M.S. Thelma, U.S.S. Pennslvania, M.S. Sofie Bakke, K. R. Kingsbury, Knud Rasmussen, Pan. S.S. Aurora, Condor, U.S.A.T. Leonard Wood, Vitus Bering, Barge No. 6 (Shell Oil Co.), Fr. Str. San Diego, Vermar, M.S. Olinda.

COMMERCIAL IRON WORKS

412 Southeast Stephens St.
Portland, Ore.

NEW CONSTRUCTION:

One 35-ton crane all-welded steel whirley derrick barge; 120′ x 44′ x 9′; for U. S. Engineers, Bonneville, Ore. Keel laid June 5, 1939; launched September 16, 1939.

One twin screw tunnel all-welded stern towboat; 2500 H.P.; 93′ x 25′ x 6′. Keel laid October 2, 1939; launching date November 8, 1939.

One 200,000-gal. capacity all-welded oil barge; 144′ x 35′ x 8′. Keel laid October 16, 1939; launching date November 18, 1939.

One 15-ton whirley derrick barge, all-welded; 93′ x 40′ x 6′. Keel laid November 25, 1939; launching date December 23, 1939.

CONSOLIDATED STEEL CORP., LTD.

Maywood, Los Angeles, Calif.

NEW CONSTRUCTION:

Hulls Nos. 156-159, four C-1-BT, full scantling, turbine propulsion cargo vessels for U. S Maritime Commission.

FELLOWS & STEWART, INC.

Wilmington, Calif.

DRYDOCK AND ROUTINE REPAIRS: Ryono, Miss California, Bessemer, Lebec, Blue Peter, Vellron, Perlita, Vivo, Torqua; 43 smaller pleasure and commercial boats.

GENERAL ENGINEERING & DRY DOCK CO.

Foot of Fifth Avenue
Oakland, Calif.

NEW CONSTRUCTION:

Hull No. 38, one derrick barge for San Francisco Bridge Co.; wood hull; 75′ x 39′ 10″ x 8′ 3½″. Delivered October 27, 1939.

DRYDOCK AND ROUTINE REPAIRS: Lumberman, Hoquiam, Tennessean, Lumbertown, Stanwood, Chilkat, Barge Haviside No. 5, Dump Barges Nos. 16 and 19, Derrick Barges Nos. 9 and 10, Tug Despatch No. 6; Gas S. California Rose, Diana, Dux, Sherman Rose, Sea Lion and Mineo Brosi.

HARBOR BOAT BUILDING CO.

Berth 264, Fish Harbor
Terminal Island, Calif.

NEW CONSTRUCTION

Madeirense, tuna bait fishing vessel 125′ x 28′ x 14′; 500 gross tons; for Madeirense Inc., San Diego, Calif. 600 H.P. Fairbanks Morse main diesel engine; 3 auxiliaries, 450 total H.P.; 12 knots speed; cost $185,000; quick freezing refrigeration. Launching date, November, 1939; delivery date, January, 1940.

HONOLULU IRON WORKS

Honolulu, T. H.

DRYDOCK AND ROUTINE REPAIRS: Kewanee, M. S. Moi.

LAKE UNION DRY DOCK & MACHINE WORKS

Fairview and Galer Sts.
Seattle, Wash.

NEW CONSTRUCTION:

One stern wheel steam snagboat, Preston, for U. S. Engineer Dept. Delivery date November 15, 1939.

LAKE WASHINGTON SHIPYARDS

Houghton, Wash.

NEW CONSTRUCTION: 200 foot steam geared turbine steel survey ship Explorer for U. S. Coast & Geodetic Survey. Launching date, October 14, 1939; estimated delivery date, January 1, 1940.

LOS ANGELES SHIPBUILDING & DRY DOCK CORP.

Los Angeles Harbor
San Pedro, Calif.

DRYDOCK AND ROUTINE REPAIRS Edwin B. DeGolia, Pegasus, Montebello, Yacht Paragon, G. P. Barge No. 3, Yacht Radio, M.S. Koki Maru No. 8, M.S. Kuzi Maru No. 7, Argyll, Lighter Barge No. 6, Catalina, Eureka, El Capitan, Nevadan.

MARE ISLAND NAVY YARD

Mare Island, Calif.

NEW CONSTRUCTION:

Tuna, submarine (SS203); keel laid July 19, 1939.

Gudgeon, submarine (SS211); order received for construction on June 2, 1939.

Fulton, submarine tender (AS11); keel laid July 19, 1939.

Order received for construction of one covered lighter (YF-259), dated June 30, 1939.

Order received for construction of two fuel oil barges (Y044 and Y045), dated July 11, 1939.

DRYDOCK AND ROUTINE REPAIRS: Indianapolis, Philadelphia, Cincinnati, Paterson, Jarvis, McCormick, Crowinshield, Evans, Philip, Aaron Ward, Buchanan, Twiggs, Hale, Lawrence, Sands, MacLeish, Lea, Overton, Pelican, Montgomery, Gamble, Arctic, Antares, Pollack, Cuttlefish, Cachalot.

THE MOORE DRY DOCK CO.

Oakland, Calif.

NEW CONSTRUCTION:

Hulls Nos. 195, Sea Arrow, and 196, two cargo vessels for U. S. Maritime Commission; LOA 492′ 0″, LBP 465′, breadth molded 69′ 6″, depth molded 42′ 6″, SHP normal 8500, SHP max. 9350, dis. 17,600 tons, deadweight 11,926 tons; steam turbine propelled. No. 195, keel laid March 18, 1939; launched September 15, 1939. No. 196, keel laid September 19, 1939.

DRYDOCK AND ROUTINE REPAIRS: Willmoto, Point Clear, Claremont, Gen. Frank H. Coxe, Point Coleta, Saporea, Californian, Silverbeech, Point Bonita, St. Joseph, Dakotan, Betsy Ross, Blue Water, Crusader, Valiant, Gracie S., San Giovanni, Vita, Ocean Pride, Komoku, Gallant, Point Ancha, Despatch No. 1, Carolinian, Guide, Bremen, Paul Shoup, State Dredge No. 3, El Commodore, San Bernardino, Silveray, Michigan, Sunlight, Sea Lion, Yuba, Shoshone, Sea Ranger, W. S. Miller, Texas, Olopania, California Standard, S. C. T. Dodd, Hawaiian, Governor Irwin, E. P. Ripley, Modjokerto, Floridian, Arkansan, Wood, Portola No. 1, United, J. B. Edwards, New St. Joseph, Chilkat, Angel Island, Silverguava.

THE PUGET SOUND NAVY YARD

Bremerton, Washington

NEW CONSTRUCTION:

Charles F. Hughes (Destroyer No. 428); standard displacement 1600 tons; order placed by Navy Department December 7, 1937. Keel laid January 3, 1939.

★

S. S. LURLINE ∗
S. S. MARIPOSA
S. S. MONTEREY
S. S. MATSONIA

Matson Line
TO Hawaii · NEW ZEALAND · AUSTRALIA
VIA SAMOA FIJI

Happily, each year, thousands find their dream-picture of a South Seas isle realized . . . in Hawaii.

FARES: (*each way*) California to Honolulu
First Class *from* $125 - Cabin Class *from* $85

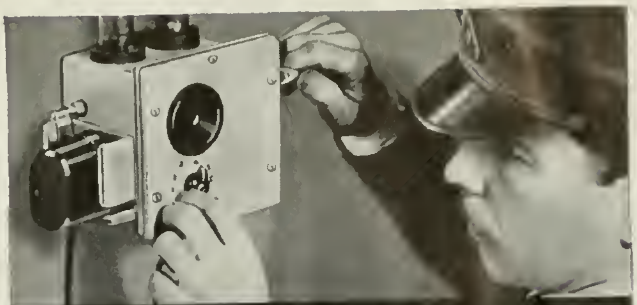
MATSON SOUTH PACIFIC CRUISES. *Personally-escorted* every four weeks to New Zealand and Australia via Hawaii. Samoa. Fiji. 17,000 miles . . . 48 days . . . 12 shore excursions. All-inclusive-cost. *from* $775.

OPERATING UNDER THE AMERICAN FLAG

SHIPPERS: The *Lurline* and *Matsonia* provide swift freight service to Hawaii. The *Mariposa* and *Monterey* continue to New Zealand and Australia via Samoa, Fiji. Modern refrigeration facilities on all four ships. Also frequent freighter service from Pacific Coast ports.

MATSON NAVIGATION COMPANY
THE OCEANIC STEAMSHIP COMPANY
San Francisco Los Angeles San Diego
Seattle Portland

M



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Monssen (DD436); keel laid July 12, 1939.

Woban (YT138); keel laid September 23, 1939; **launched November 6, 1939.**

Ala (YT139); keel laid September 23, 1939; **launched November 6, 1939.**

Barnegat (AVP10); keel laid October 27, 1939.

Biscayne (AVP11); keel laid October 27, 1939.

Ships authorized, work not started: Casco (AVP12), and Mackinac (AVP13).

DRYDOCK AND ROUTINE REPAIRS:

Houston, Haida, Colorado, Lexington, Patoka, Yorktown, Brooklyn.

TODD SEATTLE DRY DOCKS, INC.

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Seattle, Wash.

DRYDOCK AND ROUTINE REPAIRS:

Camden, Waipio, David W. Branch, Tongass, Evanger, Lewis Luckenbach, Lena Luckenbach.

WESTERN BOAT BUILDING CO., INC.

2505 East 11th Street
Tacoma, Wash.

NEW CONSTRUCTION:

Hull No. 140, purse seine fishing vessel, 81′ x 21′ x 11′; 220 H. P. Atlas Diesel engine. Launching date, October 20, 1939; **delivery date, November 30, 1939.**

Hull No. 141, purse seine fishing vessel; keel laid November 1, 1939.

DRYDOCK AND ROUTINE REPAIRS:

Fishing Boats Valencia, Sitka, Sonja, Kingfisher.

Atlantic, Lakes, Rivers

AMERICAN BRIDGE COMPANY

Pittsburgh, Pa.

NEW CONSTRUCTION:

One relay barge 104′ x 34′ x 8′ for the Panama Canal. Delivery date January 1, 1940.

Ten cargo barges 175′ x 26′ x 1′ for stock.

Six oil barges 195′ x 35′ x 10′ for Socony-Vacuum Oil Co.

BATH IRON WORKS

Bath, Maine

NEW CONSTRUCTION:

Hulls Nos. 177 and 178, DD423 and DD424, two 1620-ton destroyers for U. S. Navy. Contract date September 30, 1937; delivery dates April and June, 1940, respectively.

Hulls Nos. 180-181, DD429 and DD430; two 1620 ton destroyers for U. S. Navy. Contract dated August 15, 1938; delivery dates, December, 1940, and February, 1941, respectively.

Hulls Nos. 182-183, DD437 and DD438, two 1620-ton destroyers for U. S. Navy. Contracts dated June 15, 1939. Delivery dates June 15, 1941, and August 15, 1941.

BETHLEHEM STEEL COMPANY, INC.

Shipbuilding Division
Fore River Yard
Quincy, Mass.

NEW CONSTRUCTION:

CV7, Wasp, Airplane Carrier for U. S. Government; keel laid April 1, 1936, launched April 4, 1939.

Hulls Nos. 1470 and 1471, two 1500-ton destroyers for U. S. Government; delivery dates March, 1940 and May, 1940.

Hulls Nos. 1474, 1475, 1476 and 1477, four freight vessels for American Export Lines, Inc.; 450′ B.P. x 66′ x 42′3″; 16½ knots; geared turbines and water tube boilers. Keels laid, No. 1474, November 10, 1938; No. 1475, December 16, 1938; No. 1476, March 16, 1939; No. 1477, July 27, 1939. Launching dates, No. 1474, July 18, 1939; No. 1475, September 16, 1939. **No. 1474 delivered September 28, 1939.**

Hull No. 1478, Massachusetts; 35,000 ton battleship for U. S. Navy.

Hulls Nos. 1479 and 1480, two 6000-ton cruisers for U. S. Government.

Hulls Nos. 1481-1484, four freight vessels; 450′ BP. x 66′ x 42′ 3″; 16½ knots; geared turbines and water tube boilers.

BETHLEHEM STEEL COMPANY, INC.

Shipbuilding Division
Sparrows Point Yard
Sparrows Point, Md.

NEW CONSTRUCTION:

Hulls Nos. 4329, Platte; 4330, Esso Annapolis; 4331; three 16,300 dwt. ton tankers for Standard Oil Co. of N. J.; 18 knots speed. Contract signed January 3, 1938. No. 4329 launched July 8, 1939. No. 4330, keel laid December 21, 1938; launched September 9, 1939. No. 4331, keel laid September 18, 1939.

Hulls Nos. 4337, Delbrazil; No. 4338, Deltargentino; and No. 4339, Delorleans; three passenger and cargo ships for Mississippi Shipping Co. Contract signed December 21, 1938. Keels laid, No. 4337, April 10, 1939; No. 4338, May 8, 1939. **Launching date, No. 4337, December 16, 1939.** Delivery dates, No. 4337, June 1, 1940; No. 4338, September 1, 1940; No. 4339, December 1, 1940.

Hull No. 4340, tanker for Union Oil Co. of Calif. Contract signed May 1, 1939. Keel laid July 18, 1939.

BETHLEHEM STEEL COMPANY, INC.

Shipbuilding Division
Staten Island Yard
Staten Island, N. Y.

NEW CONSTRUCTION:

Hulls Nos. 8001, Navajo; 8002, Seminole; and 8003, Cherokee—three U. S. Navy fleet tugs. No. 8001, keel laying date December 12, 1938; launched August 17, 1939; delivery date January 1, 1940. No. 8002, keel laying date December 16, 1938; launched September 15, 1939; delivery date March 1, 1940. No. 8003, keel laying date December 23, 1938; **launching date November 10, 1939;** delivery date May 1, 1940.

Hulls Nos. 8015-8019, five cargo vessels, C-1-B design, for U. S. Maritime Commission. Length O.A. 417′ 9″, breadth 60′ 0″, depth 37′ 5″. Keel laying dates March 1, April 1, July 1, October 15 and December 15, 1940, respectively. Launching dates October 1 and December 1, 1940; and April 1, July 1 and September 1, 1941, respectively. Delivery dates April 1, June 1, August 1, November 1, 1941; and January 1, 1942, respectively. All above dates tentative.

BROOKLYN NAVY YARD

Brooklyn, N. Y.

NEW CONSTRUCTION:

CL 50, Helena, light cruiser; L.B.P. 600′ beam 61′7¾″, standard displacement 10,000; geared turbine engines; express type boilers; keel laid December 9, 1936; launched August 27, 1938; **estimated delivery November 30, 1939.**

BB 55, North Carolina, battleship; L.B.P. 714′ 0″, beam to outside armor 108′ 0″, std. displ. 35,000 tons; geared turbine engines; express type boilers. Keel laid October 27, 1937; estimated launching date March 1, 1940; contract delivery September 1, 1941; estimated delivery date October 15, 1941.

Battleship No. 61, order placed June 2, 1939; to be built under authority of Naval Appropriation Act for year 1940. Estimated delivery date August 1, 1943

IRA S. BUSHEY & SONS, IN

Foot of Court Street
Brooklyn, N. Y.

NEW CONSTRUCTION:

One steel tug 100 x 25′ x 12′; 805 [illegible] Fairbanks-Morse engine. Delivery date May 1, 1940.

One wooden deck scow 118′ x 36′ x 10′. **Delivery date December 28, 1939.**

CHARLESTON, S. C., NAVY YARD

Charleston, S. C.

NEW CONSTRUCTION:

One harbor tug, Heekon (YT141); LOA 100′, beam 25′; authorized July 7, 1938.

One harbor tug, Nokomis (YT142); LOA 100′, beam 25′; authorized July 7, 1938.

Six destroyers.

Two destroyers, DD443, Swanson; and DD444, Ingraham; authorized March 27, 1934.

One harbor tug, YT143, Small.

DEFOE BOAT & MOTOR WORKS

Bay City, Mich.

NEW CONSTRUCTION:

Hull No. 166, sub-chaser PC-451, for U. S. Navy. Diesel driven; 170′ x 21′ 6″. General Motors engines; steel construction. Delivery date June, 1940.

THE DRAVO CORPORATION

Engineering Works Division
Pittsburgh, Pa., and Wilmington, Del.

NEW CONSTRUCTION:

Hull No. 1567, one welded flush deck cargo box barge 100′ x 26′ x 6′ 6″ for stock; 165 gross tons.

Hulls Nos. 1569-1572, four welded flush deck cargo box barges 130′ x 30′ x 7′ 6″ for stock; 1000 gross tons.

Hulls Nos. 1576-1577, two welded steel oil barges 195′ x 35′ x 10′ for stock; 1222 gross tons.

Hull No. 1594, one welded steel wharfboat hull 296′ 2″ x 57′ x 6′; 4840 gross tons.

Hulls Nos. 1605-1608, four welded covered cargo barges 175′ x 26′ x 11′; 2120 gross tons.

Hulls Nos 1617-1622, six welded steel coal barges 175′ x 26′ x 11′, for stock; 2832 gross tons.

Hulls Nos. 1623-1628, six welded steel coal barges 134′ x 34′ x 17′ for stock; 4602 gross tons.

Hull No. 1629, one welded steel oil barge 101′ x 34′ x 13′ for Val Line, Inc., N.Y.C.; 397 gross tons.

Hulls Nos. 1630-1639, ten welded steel

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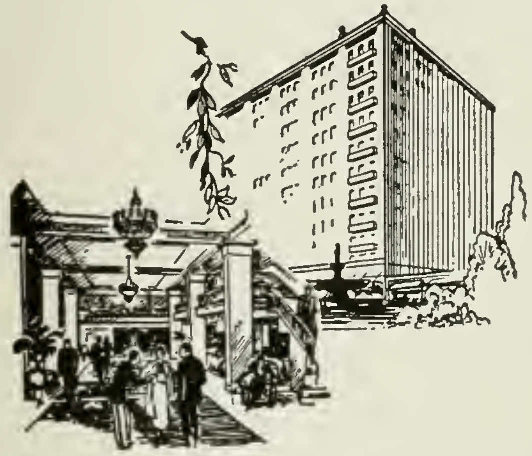

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Regular sailings from and to Providence

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HOUSTON, MOBILE, NEW ORLEANS AND PACIFIC COAST PORTS
FREQUENT SAILINGS TO AND FROM TAMPA

LUCKENBACH LINES
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Head Office: 120 Wall Street, New York

coal barges 175' x 26' x 11' for stock; 4720 gross tons.

Hulls Nos. 1640-1649, ten welded steel coal barges 175' x 26' x 11', for stock; 4720 gross tons.

Hull No. 1650, one welded steel coal barge 170' x 40' x 17', for Oliver Transportation Co., Philadelphia, Pa.; 1100 gross tons.

Hull No. 1651, one 1300-H.P. steel hull diesel towboat for Union Barge Line Corp., Pittsburgh, Pa.; 550 gross tons.

Hull No. 1652, one 25-ton floating crane for U. S. Navy, Mare Island, Calif.; 335 gross tons.

Hulls Nos. 1653-1656, four welded steel carfloats 330' x 40' x 11' for Long Island RR, Philadelphia, Pa.; 5212 gross tons.

Hulls Nos. 1657-1658, two steel barges 50' x 20' x 5' for War Department, Corps of Engineers, Office of Chief of Eng., Washington, D. C.; 76 gross tons.

Hull No. 1659, one welded steel oil barge 148' x 38' x 9' for Pacific Dry Dock & Repair Co., San Francisco, Calif.; 426 gross tons.

Hulls Nos. 1660-1673, fourteen welded steel coal barges 210' x 26' x 11' for Wheeling Steel Corp., Wheeling, W. Va.; 7924 gross tons.

Hull No. 1674, one 700-H.P. twin screw diesel towboat hull 135' x 26' x 8' for Wheeling Steel Corp., Wheeling, W. Va.; 290 gross tons.

ELECTRIC BOAT CO.

Groton, Conn.

NEW CONSTRUCTION:

Hull No. 34, Sealion (SS195); 1450 tons; keel laying date June 20, 1938; launched May 25, 1939; **delivery date November 27, 1939.**

Hull No. 35, Tambor (SS198); standard displacement 1475 tons; keel laying date January 16, 1939; delivery date August, 1940.

Hull No. 36, Tautog (SS199); standard displacement 1475 tons; keel laying date March 2, 1939; delivery date October, 1940.

Hull No. 37, Thresher (SS200); standard displacement 1475 tons; keel laying date May 15, 1939; delivery date December, 1940.

Hull No. 39 Gar (SS206); standard displacement 1475 tons.

Hull No. 40 Grampus (SS207); standard displacement 1475 tons.

Hull No. 41 Grayback (SS208); standard displacement 1475 tons.

Hull No. 42, Mackerel (SS204); standard displacement 800 tons.

THE FEDERAL SHIPBUILDING AND DRY DOCK COMPANY

Kearny, N. J.

NEW CONSTRUCTION:

Hull No. 153, tanker for Standard Oil Co of N. J.; keel laid March 13, 1939; **launching date November 4, 1939.**

Hulls Nos. 157, Flying Cloud; 158 and 159; three C-2 cargo vessels for U. S. Maritime Commission. Keels laid May 26, 1939. No. 157 launched September 30, 1939. **No. 157 delivered November 1, 1939.**

Hulls Nos. 160 and 161, two torpedo boat destroyers for the United States Navy. Keels laid March 1, 1939

Hulls Nos. 162-167, six C-3 cargo vessels for U. S. Maritime Commission. Keels laid, No. 162, May 8, 1939; No. 163, July 24, 1939; No. 164, October 9, 1939.

Hulls Nos. 168-169, two 6000 ton cruisers for U. S. Navy.

Hulls Nos. 170-171, two torpedo boat destroyers for the United States Navy.

Hulls Nos. 172-176, five C-1 cargo vessels for U. S. Maritime Commission.

Hulls Nos. 177 and 178, two tankers for the Standard Oil Co. of N. J.

Hulls Nos. 179-186, eight C-2 cargo ships for U. S. Maritime Commission.

THE INGALLS SHIPBPILDING CORP.

Yards: Pascagoula, Miss.; and Decatur, Ala.

NEW CONSTRUCTION:

Four C-3 cargo vessels.

Four C-3 cargo and passenger vessels.

Two sand-gravel barges.

One ferryboat, Plaqumine, La.

Two flatdeck barges for general cargo.

LEVINGSTON SHIPBUILDING CO.

Orange, Texas

NEW CONSTRUCTION:

One all welded towboat; LOA 80', beam OA 22' 7", depth 9' 6". Powered by 550 H.P. diesel. For W. G. Coyle & Co., New Orleans, La. Delivery date January, 1940.

One all welded diesel electric automobile and passenger ferry 185' 2½" LOA x 55' beam over guards x 15' 6" deep, for The Electric Ferries, Inc., NYC. Powered with 950 H.P. General Motors diesel with one 750 H.P. propelling motor. Delivery date, January 1, 1940.

One all-welded twin screw automobile and passenger ferry; 132' LOA, 43' 8½" beam and 10' deep; for Venezuela interests. Powered with two 200 H.P. Atlas diesel engines.

NEWPORT NEWS SHIPBUILDING & DRYDOCK CO.

90 Broad Street, New York

NEW CONSTRUCTION:

Hull No. 364, Russell (414), destroyer; keel laid December, 1937; launched December 8, 1938.

Hull No. 369, twin screw mail, passenger and cargo liner for United States Lines Co.; length 723', beam 92', depth 45'. Keel laid August 22, 1938; launching date, August 31, 1939.

Hulls Nos. 370, 371 and 372, three oil tankers for Standard Oil Company of New Jersey; gross tonnage about 11,500 tons; L.B.P. 525', breadth molded 75', depth molded 39'. Keels laid, No. 370, January 16, 1939; No. 371, May 8, 1939. No. 370 launched September 29, 1939.

Hulls Nos. 373, 374, 375 and 376, four single screw cargo vessels for United States Maritime Commission; turbine propulsion; gross tonnage, Nos. 373 and 374, about 7300 tons; Nos. 375 and 376, about 8000 tons; length 435', breadth 63', depth 40' 6". Keels laid, No. 373, November 14, 1938; No. 374, November 28, 1938; No. 375, March 6, 1939; No. 376, May 1, 1939. Launching dates, No. 373, April 28, 1939; No. 374, June 21, 1939; No. 375, October 18, 1939.

Hull No. 378, battleship, 58, Indiana, for U. S. Navy.

Hulls Nos. 379, 380, 381, 382, 383 and 384, six single screw combination passenger and cargo vessels for U. S. Maritime Commission; length 465', breadth 69' 6", depth 42' 6", gross tonnage about 9100 tons. Keel laid, No. 379, October 2, 1939.

Hull No. 385, aircraft carrier No. 8, Hornet, for U. S. Navy.

THE NEW YORK SHIPBUILDING CORPORATION

Camden, N. J.

NEW CONSTRUCTION:

One destroyer tender for U. S. Navy; order placed December 27, 1937. Launched May, 1939.

One seaplane tender for U. S. Navy; order placed December 27, 1937.

One destroyer tender for U. S. Navy; order placed October 14, 1938.

One seaplane tender for U. S. Navy; order placed October 14, 1938.

One battleship for U. S. Navy; order placed December 1, 1938. Keel laid July, 1939.

One repair ship for U. S. Navy; order placed July 20, 1939.

PORTSMOUTH, N. H., NAVY YARD

Portsmouth, N. H.

NEW CONSTRUCTION:

Seven submarines, Searaven, Seawolf, Triton, Trout, Marlin, Grayling and Grenadier.

THE PUSEY & JONES CORP.

Wilmington, Del.

NEW CONSTRUCTION:

Two streamlined diesel tugs for Curtis Bay Towing Company; powered by 320 H.P. Enterprise engines; cost $200,000. Launching date, October 28, 1939; **delivery date, November, 1939.**

SUN SHIPBUILDING AND DRY DOCK COMPANY

Chester, Pa.

NEW CONSTRUCTION:

Hull No. 180, single screw diesel cargo vessel, C-2 design, for U. S. Maritime Commission; equipped with Sun-Doxford engine. **Delivery date November 24, 1939.**

Hulls Nos. 182-185, four single-screw diesel cargo vessels for U. S. Maritime Commission, C-3 design. Equipped with Busch Sulzer engines. **Delivery dates December 23, 1939; January 23, March 10 and April 15,** 1940, respectively.

Hulls Nos. 186-189, four C-3 single screw combination passenger and cargo vessels; diesel propelled; equipped with Sun-Doxford engines. Delivery dates October 6, 1940; December 5, 1940; February 3, 1941, and April 4, 1941.

Hull No. 190, one 16-knot tanker for Texas Co.; single screw steam turbine; 13,285 tons dwt. Delivery date, June, 1940.

Hulls Nos. 191-192, two single screw steam turbine railroad car carriers for Seatrain Lines, Inc. Keels laid July 28 and August 17, 1939; delivery dates April 15, 1940, and June 1, 1940.

TAMPA SHIPBUILDING & ENGINEERING CO.

P. O. Box 1838

Tampa, Fla.

NEW CONSTRUCTION:

Hulls Nos. 33-36, four C-2 type cargo vessels for U. S. Maritime Commission; 459' x 63' x 31' 6"; 9291 dwt. tons; diesel powered. Launching date, October 31, 1939.

Hulls Nos. 37-40, four C-2 type cargo vessels for U. S. Maritime Commission; 459' x 63' x 31' 6"; 9291 dwt. tons.